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[ORIGINAL COMMUNICATION.]

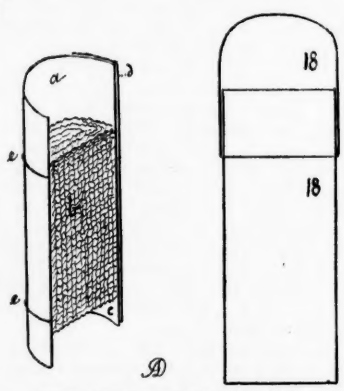
## AN IMPROVED COIL FOR MILK ANALYSIS.

BY CHARLES RICE, NEW YORK.

THE advantage of employing the so-called Adams' coil (of thick blotting paper) in the estimation of milk solids, and particularly of milk fat, is generally recognized; careful trial experiments having shown that, by its use, about 0.2 per cent more of fat can be extracted from milk than by any other method.

While this fact is undisputed, there remain, however, some slight drawbacks, chiefly mechanical or manipulative, which not seldom inconvenience the operator. These drawbacks arise both from the material the coil is usually made of, and from its shape.

The coils are made of thick blotting paper, the kind generally preferred being that known as "white demy blotting, mill 428, 38 lbs." The best "Treasury" blotting paper is also used. Now, unless the coil is made rather loosely, which is accomplished sometimes by rolling up a thread with the strip of paper, it is not always easy to cause the milk to sink into the coil with sufficient rapidity. Moreover, the shape at either end is not conducive to a rapid absorption, and there is not seldom a loss from milk running down the side or escaping through a central passage.




Rice's Milk Coil and Weighing Tube.

Several modifications of Adams' coil have been proposed from time to time, one involving the use of asbestos, another that of cotton, but on trial I have found them to offer no material advantages.

A good milk coil, or cartridge, should possess the following properties:

1. It should have a shape which permits the whole amount of the milk taken for analysis (say 5 to 10 Gm.) to be applied, or poured upon it quickly, without risk of loss.

2. It should be so porous that it will readily permit the escape of water, during drying, for the estimation of solids, and afterwards readily admit the ether in the estimation of fat.

The material which I have found to answer best for this purpose is the so-called "absorbent gauze," also known as "bleached hospital gauze," used for surgical dressings. It is a light open-mesh cotton fabric, having about 40 fine shreds to the linear inch, and weighing about 1¼ av. ounces per square yard.

The milk coils, or cartridges, which I have been in the habit of using, consist of a small roll of this gauze enclosed in a wrapper of blotting paper, and their mode of preparation is as follows:

Spread out a square yard of the gauze on a flat surface, fold it twice in one direction to reduce it to 36x9 inches, then fold it upon the long side in laps of 1¼ inches in width, so that when the whole is folded it will present a strip of 1 yard in length and about 1¼ to 1½ inches in width, and will consist of some 18 to 20 layers.

Now begin to roll the strip up on the narrow end, like a bandage, but not too tight, until about 5 or 5½ inches of the gauze have been rolled up; cut the strip slantingly—that is, not perpendicular to its body, but under an angle, so as not to cause "bunching" when wrapped in paper. Place the roll upon a strip of thick blotting paper 4 inches long and 2¾ inches wide, and roll the latter over it so as to have it (the paper) project at one end about one-fourth inch over the gauze coil and about three-fourths inch at the other; then tie the coil with two threads. It will thus be 2¾ inches long and about seven-eighths inch in diameter.

Fig. 1 represents a section of one of these coils, *b* being the gauze coil, *a* and *c*, respectively, the larger and smaller free compartment, *d* is the overlap of the paper cover, and *e e* the strings.

The larger compartment (*a*) of this cartridge serves as a funnel, into which the full quantity of the milk to be tested is poured at once. A coil of this kind—intended for the smallest size of Soxhlet's extractor—will easily take from 8 to 10 Gm. of milk, and the latter will never entirely soak down to the bottom of the paper wrapper. If it should soak to the bottom of the gauze coil, this will do no harm, as it is one-fourth inch above the end of the paper.

These coils may easily be prepared in quantity, then extracted with ether, and kept in a drying oven, so as to be ready for instant use.

I am in the habit of using very light glass weighing tubes, with snugly fitting covers, each being numbered both on the body and on the cap. A cartridge, perfectly dry, is first weighed in one of these tubes, and all subsequent weighings of it are made in the same tube. The milk to be examined is weighed in a separate stoppered graduated tube, then a suitable quantity of it, judged by guess and experience—corresponding to, say, about 8 Gm.—is poured into the compartment *a* of the coil, which had previously been taken from the weighing tube. The graduated tube is weighed again, and the difference corresponds to the milk taken for analysis. The coil at once absorbs the milk, and is then transferred on a capsule to the drying oven. When dry it is weighed for determination of solids, and the fat then determined by extraction with ether in the usual manner.

The size of these cartridges may of course be varied according to the size of the extractor in which they are to be used.

I am quite certain that those who will try the gauze coils will prefer them to anything else heretofore proposed.

NEW YORK, February 12th, 1890.

## INFINITIES IN PHARMACY.*

BY PROF. J. U. LLOYD, OF CINCINNATI.

[Introduction omitted.]

LET us, in the spirit of a loftier scientific inquiry, lift our eyes to the vast arch beyond us and question the silent depths of pharmacal space. The teacher and the student of pure chemistry, the student in pharmacy, the physician, the biologist, the physiologist, and the toiler in the pharmaceutical laboratory, all may unite in the scrutiny, free of interference with each other, for, as the centuries pass, its disclosures will still multiply.

To the student of pharmacy it is particularly inviting. To his exertions is due the vantage ground we now enjoy for observation. It is a common remark among self-made millionaires that the first thousand is won with greater difficulty and hardship than all the remainder. By a parity of experience we may, no doubt, prove that the hard-fought ground we now occupy may be extended a thousand-fold with comparatively little effort; nor should it be thought that I belittle the past when I contrast the insignificance of the work it has accomplished with what remains undone. In this, as in all fields of research, the pioneers are entitled to the chief honors. It is the easy task of later generations that demands of them results of a magnitude so much greater.

To the matriculate in pharmacy, listening day after day to accomplished professors, and contemplating the seemingly endless literature on the subject, it may possibly appear that no field remains for fresh explorations. With due respect to the accomplished master workmen, whom none can honor more than I, and without any desire to shatter an image or break an idol, I make bold to say that the mass of these observations magnifies the work in front of us as surely as an augmenting globe has an increasing area; and, further, that access to new territory is now easier than ever before. And let it be remembered that this area increases as the square of the distance traversed; that it is not merely a double but a fourfold obligation that rests upon us as heirs of the past.

Let us take up briefly a few of the opportunities that offer to every pharmaceutical student through which we may find our bearings for a survey of the distances that stretch before us, as well as the impediments to be encountered; for it must not be assumed that all are equally ready for the new era.

There are pharmacists who, sour over revolutions that have thrown the antiquated apothecary into the curiosity shop with his drenches and boluses, will never be comforted with anything new.

* From an address delivered before the College of Pharmacy of the City of New York, Thursday, February 20th, 1890.

Others believe that the study of pharmacy, in all respects, is for the gain that follows a mercantile business, and that there is no liberty for workers and investigators beyond the path that leads to the dollar mark; and they have ample precedent to support them.

There are also pharmacists who, models in their way, may object to comparisons that might infect a pharmaceutical student with the notion that his profession has anything to offer him but drudgery; and doubtless their personal experience has been such as in a manner to justify the objection. And yet I believe that, if we would hold our own birthright, to say nothing of enlarging the heritage of our successors, the student of to-day must be enthusiastic and must gauge his work by higher standards of success than have prevailed hitherto. The rule-of-thumb, haphazard, unsystematic searcher will be distanced by those with definite aims. There must be a thorough college education as a foundation. The student must begin his work with his feet on a level with the heads of those who delve to-day. He must lift his eyes beyond the fitful light of our feeble torches, if he is not doomed to miss the bursting of the dawn.

But a lasting truce to the spirit of cavil. With all our differences, we have common ground to stand upon and a common interest in the domain before us. And while it may be thought at first blush that before the pioneers in other sciences there lies a wider field for research than that which greets the student in pharmacy, I, for one, cannot concur in the opinion. Indeed, I shall make bold tonight to invite you to a comparison with the conditions of that science which of all others is held to be the very embodiment of infinity—into the realm of the astronomer himself.

The late R. A. Proctor, in that series of popular lectures of which "Other Worlds than Ours" was an attractive member, compared our earth with those about us, our universe with those by which it is surrounded, and carried us into the star dust of space that before the most powerful telescope shades off into the, to us, edge of astronomical infinity. And the same glowing conception had before his day burned on the canvas under the spell of the word-painter Richter's hand. Before such pictures we close our eyes that we may think in silence. But the mind wearies and the brain aches in an attempted comprehension of that endless chain where there is neither beginning nor end. The magnitude of one system is swallowed up in the immeasurable vastness of the surrounding systems, and infinity envelops all. In my laboratory, when perplexed over problems that followed problems, I have thought again and again of such revelations, and dared to imagine that a field of research as vast even as this exists in pharmacy.

In studying the fragmentary history of comets—under the instruction of Prof. Wilson, late of the Cincinnati Observatory, who has so admirably portrayed some of these erratic visitors—the magnitude of those travelling monsters as compared with things mundane, and their mysterious motions, seemed scarcely less wonderful than did their littleness contrasted with the world of space they traverse; and yet these wonders are not, perhaps, more incomprehensible than those pharmaceutical verities connected with the migration of atoms that I have ventured to place in comparison with them.

The late Prof. Carpenter, the eminent physiologist, led us, at a meeting of the Pharmaceutical Association at Niagara, into the wonderland of littleness, the beauties of physiological microscopy. The immeasurable distances spanned by the telescope are not more impassable to man than the chasm that separates us from the infinitely little revealed by the microscope. The former, stretching outward in whatever direction we may turn, leave an endless trail of ciphers behind and beggar computation; the latter reach just as far into fractional infinity, an infinity of decimals, and we draw an idea of the one by contrasting it with the other. Startling as such a comparison may be, a slight familiarity with the questions before us will soon strip it of all extravagance, and prepare us for the bold inquiry, Have we such distances in pharmacy?

Without hesitation I answer, Yes; and to me they do not yield in immensity to those in any other line of investigation whatever. Study teaches me that there is no limit to our field. It is boundless, and stretches from an unknown to an unknown. Other sciences cannot claim more. The track that leads us to the star dust is no more interminable. Infinity unfolds within infinity, and all tokens of a centre recede before our quest, as unattainable as the circumference of the astronomer's sphere.

We are met at the outset with a difficulty that not only defies penetration but baffles description. For the present purpose we may loosely define a plant as an organism evolved, under the domination of an elusive principle called life, from inorganic or disorganized materials. So far as we are able to determine, it owes its peculiar nature, its structure and properties, wholly to this quickening principle. Ignorant of the processes by which it has been differentiated from all other plants, the botanist describes and names a plant according to the structure it has assumed under the inscrutable laws of its development. The elementary substances which enter into its composition would assume, under the government of a different plant life, a divergent structure and different properties; and, subjected to the action of natural decomposition, in either case would return to their original state. The process of growth may be arrested at any stage; the process of decomposition may be hastened or retarded. But at whatever point we may intrude in Nature's living processes, what assurance have we that the plant will surrender to the mechanical processes of the laboratory the secret of the principles which it owns solely by virtue of its life? Can the subtle alchemy by which, out of the same elements, one plant yields bread and another poison, be recorded in the barbaric language of retorts and crucibles? Are they not as far apart as the mummery of the soothsayer is from the veiled future he affects to penetrate? Painful as the admission may be, we stand dumb before the mystery of the simplest plant in its living entirety. And when we turn to its crude fragments, as gums, resins, barks, leaves, etc., we have scarcely the first clue to their true relationships. Or when at last we crush this thing of life that refuses to deliver up its secrets, and obtain from it, by certain processes, alkaloids, glucosides, oils, starches, sugars, acids, tannins, and other substances, all of which are more or less related and dependent one upon the other, yet we know not what infinity of other results is possible to other forms of manipulation.

Like the Widow Bedott's pies, which were pumpkin pies in the abstract, but in the last analysis were "principally ingredients," many a product of the laboratory masquerades under a title which can claim but the faintest relationship to its empirical constitution.

Now, while the different parts of the same plant are so divergent in their affinities, are we prepared to deny unperceived affinities in different plants? The spots on the distant sun may produce meteorological disturbances in an area of our globe that would not respond to the wildest commotions in another portion of the same globe.

But into this Holy of Holies we dare not attempt to lift the veil. Leaving its awful arcana undisturbed, we turn to consider plant remains as they come to us when the life is fled; for, as the butcher deals in flesh, not in animals, so the pharmacist deals with vegetable remains, not with the plants themselves. And even in this restricted sphere we are met with classes and distinctions that warn us back to still narrower bounds. For while we have here and there broken over the lines of separation that part the highest order of flowering plants from sedges and grasses, and then again from cryptogams with their subdivisions, it has been done in the likes of a border foray rather than in the way of peaceful occupation. They hang on the borders of our horizon like the nebulæ that perplex the astronomer, and yield as slowly to our methods. We must here confine ourselves to the one class which is best known.

I speak now particularly of problems in plant structure, a mere section of the pharmacist's study; and I believe we have not only not approached, in any direction, the furthest limit of such research, but have hardly begun to blaze our way through the virgin forests. And there are few of the experienced workers in this field who will not concede thus much at least.

Only a few years back, vegetable remedies consisted of tinctures, syrups, infusions, and decoctions, or parts of plants in substance. Pharmacy then was a study of mixtures, of conglomerates. In the lifetime of men about us, most alkaloids, glucosides, and other plant constituents have been brought to light, and pharmacy has now, some would fain believe, developed into a study of definite educts and products. In the time of the very apprentices in pharmacy to-day, the greater part of the important plant principles now known have been introduced, and many of us can call to mind other educts or products that as yet are in the hands of the physiological investigator or analytical chemist, and to the world unknown. As we refer to the results of these modern investigations, all will agree that, in addition to what we have found, there is much concerning each substance to leave to future scholars. I doubt if any thorough pharmacist, whatever his accomplishments, is to-day satisfied *with a single plant examination that is recorded.* Is there in this world a plant that has been exhausted of its material and its connected phyto-chemical mysteries? Every page of your dispensatory is vocal with pleas for light, further light. Your Pharmacopœia has been rewritten again and again, and is now wofully imperfect. Its pages do not bear record of a single crude vegetable structure in which the inner unknown does not merge into and envelop the known; and usually there is so little of the known that the crude drug is considered as an entirety, the committee of revision not daring the attempt to mention its several constituents.

Select an example from among the vegetable drugs that have been longest recognized as therapeutical agents, and first developed in regard to proximate constituents. Naturally, opium is named (a product only), or perhaps cinchona is preferred as the more important. Each has been subjected to lifetimes of conscientious investigation, but are not talented specialists, with the focussed light of all these years of investigation before them, still searching into their mysteries? Are they not severally shrouded in the mist of that pharmaceutical infinity which embraces

the domains of molecular and atomic space, those unfathomed depths of molecular motions that, under the influence of plant vitalities, produce substances which in themselves are perhaps marvels of simplicity on the one hand and of equal complexity on the other? We should not underestimate the achievements of the unremitting toilers who have freely given their lives to these investigations, men now with us and those who have gone before; but no man can be injured by comparing his work with Omnipotence, and probably I do not go beyond many when I say that the natural plant conditions of such presumably well-known alkaloids as morphine and quinine are to-day shrouded in obscurity, for some of us cannot concede that we have learned even the interstructural associations or combinations of these labor-ridden substances. Are we sure that the conditions in which any, even of the best known, alkaloids naturally exist are comprehended? Has it not been asserted recently, by a European author, that morphine—the alkaloid first discovered—exists in opium as a sulphate, and not (as has long been accepted) as a meconate? And I may perhaps venture to raise the question, Do we know that alkaloids undeniably exist in plants as the simple salts of acids, purely as direct acid compounds? Facts innumerable connected with the simplest of plant organizations, which this age may not bring to light, are surely veiled in these directions. Even our most common plant constituents are so enveloped. Owing to the lack of proper systems, we are hardly able to avail ourselves of the benefits of collated labor, which for the time being is quite as likely to add disorder as anything else to our stores. However, from such work systems will no doubt be evolved in time, and as a result we may look to see systematic plant studies opened up in what is now an unknown waste. Can it not be said, without fear of contradiction, that with each of Nature's crude vegetable productions there are unknowns in which speculations even are futile, because we have as yet no system upon which to base our speculations? While it is true that much which is of great interest and value to mankind has been developed in these directions, is it not also true that the sum of all the work so far accomplished is in such discordant condition as to make it imperative for others to labor afresh in these same fields? Do not our leaders recognize the fact even with regard to the best known drugs?

I remember to have read that a faithful student of entomology, who earned for himself a wide reputation by a lifework devoted to one, only one, class of insects (beetles, if memory serves me), in his old age remarked that the mistake of his life had been the spreading of his energies over too much territory, and he deplored the fact that he had not devoted his entire attention to the habits of one family of that genus. Such reflections perhaps are more likely to come over the workers in pharmaceutical plant research after they have passed their period of usefulness; but probably if one could follow another in the study of a single genus of plants, the magnitude of the field is such that the third and fourth generations would see good reasons to restrict themselves to still narrower confines. With due respect, therefore, to our workers of the past and present, it seems to me that elaboration of the ground already gone over in plant examination is the great and pressing demand of this day, and that this service is not of less importance to phytochemists than the mapping of the so-called known heavens is to astronomers. Our most familiar problems are involved in obscurity, and the facts necessary to their systematic correlation as an entirety seem to be as much beyond our instrumentalities as the most intractable nebula is beyond the great refractor of the Lick Observatory. Our finite minds are everywhere confronted with what is no doubt an orderly method, but recorded in a cipher we cannot read:

"A mighty maze, but not without a plan."

Are not these things true? And need we hesitate to speak them out? Need any student search for new material to work upon where conditions such as we have named are paramount? What thoughtful man will deny that, in whatever direction we may turn, our records need overhauling, even in the statements concerning qualities and descriptions of well-established single plant constituents?

As a further step in this line of thought—for I have as yet considered and referred to drugs of vegetable origin only that have been longest recognized and are best known—let us enumerate, besides the plants that men have attempted to investigate, those untouched by the chemist, and which have never been studied and are not even mentioned in our records. We find that those we have examined are so insignificant in numbers as to scarce justify mention. The little group so imperfectly known to us is counterbalanced by multitudes of species of which there are numberless varieties. The botanist is yet discovering *species*, yet formulating names; nor will this labor end during our generation. We have not even become familiar with the bare names of the plants he has recorded, and so light is his work compared with our own that he has but to grasp a flowering branch, describe the connections, relationships, and name it according to a system, to complete his task. Comparatively, this is a small work, and yet to-day the botanist is crying in despair at the problem of species and sub-species determination, of which the American field alone presents innumerable difficulties. Before the American flora can be considered phyto-chemically, even as superficially as our work has been done to this day with a few plants, ages will have elapsed, and the names of men now foremost in the ranks will perhaps have passed from recollection. A few dozen only of American species, more or less (usually more) imperfectly, have passed under the immature methods now known to the analyst, while east of the Mississippi River alone we have doubtless ten thousand distinct flowering plants. Add to these the flora of the great West, the untold product of South America, Asia, Europe, Africa, Australia, and the islands of the seas, and we cannot but shrink before the contrast with these unexplored wilds of the little that we know. Thousands of square miles of primeval forests, dense jungles, and grassy pampas, which form blank spaces on our maps, await the tread of civilized man. These are wastes unknown to the very explorer; the botanist has not yet set foot in these voids, and we have seen how far the botanist even now outstrips the phyto-chemist. Even as I pen these words there comes (in public print) a cablegram from a man for two years lost to sight in the "Dark Continent":

"All the stretch of country between Yambuga and this place was an absolutely new country. The darkest region of the earth, it is one great, compact, remorselessly sullen forest, the growth of an untold number of ages.

(Signed) HENRY M. STANLEY."

That wilderness has closed upon and absorbed this single thread of light, yet it must be part of the conquests of the pharmacy of the future.

Regard for some of my friends, who seem to think, or at least assume, that pharmacy has passed through the stone and bronze epochs, past the iron age and into the golden era, is drawing me back; charity for myself as well lends further hesitation, for it is not pleasant to cast the life labors of one's colleagues and self behind, to vanish like a waif in the profound, and realize that a mere trifle is worthy to survive. And yet I have hardly touched the untried shore. There are deeper mysteries interlaced.

We must not overlook the fact that so far in this argument, the boundary of which is even now all beyond our horizon, I have cited plants as if each constituent derived therefrom existed as a separate entity (which is by no means the case); and we surely have more than one hundred thousand known flowering species untouched by pharmacy and by chemistry. Each of these is, as we have seen, in itself a very multiple of subjects, and of them each integral part again may resolve itself into a complexity. In studying plants we have first barks, gums, resins, leaves, roots, seeds, and other anatomical portions, and natural educts of interest—a medley of crude substances derived from the life-giving current of a single organism, each entirely distinct, and yet some of them are so dovetailed together that even in their mummified remains it is a prodigious task to tell where our study of the one ends and that of the other begins. Not only this, but these integral portions may take upon themselves different characters under different conditions, such as influences of soil and season, or even exhibit differences in properties under conditions apparently so similar that the very conditions themselves become mysteries and subjects for new study. There are also interstructural changes unexplained and recondite. For example, tobacco when a growing plant is not the tobacco of the market; a simple (?) "curing" process, that any churl thinks he can explain, adds a something to the leaf and takes a something from it; and these somethings, if examined, divide, subdivide, and increase in complexity during the "curing" process, until, like the genii in the "Arabian Nights," they severally expand into an overshadowing presence, each branching into an infinity of its own. This is true of all other drugs; and even the influences exerted by the curing process become a study, the significance of which pharmacists have not as yet grasped.

The exasperating paucity of facts in these directions is perhaps more generally recognized and regretted by those who write our books on phyto-chemistry than by those who study them. If a man were placed before a dark wedge of infinite size, his face to the edge, a feeble light from behind him would illumine its nearer portions. If the light was gradually increased, an increasing area of illumination would spread before him, beyond which an expanding area of darkness would hover, still looming in more impenetrable profundity the more the brightness grew. From each part of a plant, beginning in its very germ and continuing to its dissolution, such wedges seem to me to radiate in countless lines from every different point of view, each expanding with the unresponsive depths beyond.

It is not for us to say that throughout this seemingly trackless void no light or system rules. But no tongue has yet pronounced its "open sesame."

I would not venture to mention the connected lines of thought that often carry our visions into other expanses correlated with these. In my laboratory I have been invariably baffled and perplexed, with prelusory enthusiasm verging towards despair; and as I turn to the authorities before whom I bow, I feel that I am not alone in this sense of helplessness, for it is evident that all are sipping from the same bowl of humiliation, which is the more apparent as each new volume devoted to phyto-chemistry appears, and we find its lines but an empty frame, with here and there an added rib, rough nailed to the structure, through the coarse meshes of which we peer into vacuity. From time to time it has been my good fortune to correspond or converse with those whose names are illustrious in our profession, and the cry is ever that of eagerness for the outreaches in pharmacy. It is not "What can we find to work upon?" but What single grain from this immeasurable storehouse shall we attempt to make our own?

I would not in this place, as before remarked, presume to carry this train of thought further, and, leaving plant crudities, more than refer to those substances that are accepted to be proximate plant constituents, and of which the dead alkaloids seem now to be unfolding into an orderly unity and to be yielding a system. These several plant principles are evolved from defunct plants by methods of pharmacy and chemistry. They appear from the nether side of phytivorous demolition, and there is a trackless space between the living plant and these sapless, disarranged products.

But enough! Let it suffice that I have tried to lead to a realization that, wherever we may be, in the most contracted nook of this sphere, there is room for all to work. I question, and, after this all too sweeping generalization, leave my hearers to answer the question, Is the immensity of space which confronts the astronomer more impenetrable? Can it be more wonderful than the infinity that surrounds us, and need we seek in other skies than our own for mysteries to fathom? Has not enough been cited to show that we have no reason to sigh for new worlds to conquer, and that the student in pharmacy need not do homage even before those who study the heavens? Not more than the merest fragment of a single line of investigation connected with phyto-chemistry has been laid bare, but those who so desire can carry it further. Inquiry will never end, for the developments in any section that may be selected will overwhelm the investigator. As we branch out into connected, intermolecular problems that I dare not suggest as possibilities in a time to come, these conceptions become more painful, and we cover our eyes and bow our heads in reverence before the very smallest of the works of the Supreme Author, for the smallest is a growing immensity to man. Such are *Infinities in Pharmacy.*

If a Sovereign Power could bring together the accumulated knowledge of the generations in pharmacy and all connected branches to this day, and with that knowledge endue a single toiler in this field, still he would be but

> "An infant crying in the night,
> An infant crying for the light,
> And with no language but a cry."

### A Convenient and Delicate Test for Nitrous Compounds in Sulphuric Acid.

MR. JOHN HENRY WILSON points out that the usual tests for nitrous acid in presence of sulphuric, fail to be of practical use when the amount of nitrous acid is very small, as the reaction is difficult to recognize. In such cases he prefers the resorcin test. He writes as follows (*Pharm. Journ.*, January 11th):

A far better test for nitrous compounds in oil of vitriol, and one which I venture to think worthy of bringing to the notice of readers of the *Journal*, I have found in resorcin (dihydroxybenzene). It is a reagent delicate and easy of application, which gives results immediately; and, unlike the permanganate and the ferrous sulphate tests, the color produced is permanent.

If a minute quantity of resorcin, taken up on the point of a penknife, be dropped into 1 C.c. of sulphuric acid previously diluted with 5 C.c. of water, a yellow color is immediately produced if any nitrous compounds are present, which is more or less intense according to the quantity. In my hands this test has proved extremely delicate and convenient, far more so than either of the tests mentioned above, or than that recommended by Frankland, viz., the sulphanilic acid, phenol, and ammonia test.

The resorcin test can be made *quantitative* in the following easy manner: 1 C.c. of the acid to be tested is diluted with 5 C.c. of water, allowed to cool, and a minute portion of resorcin is dropped into it and stirred with a glass rod until it is dissolved. The color is noted. To 1 C.c. of pure acid, which has been proved not to give any color on the addition of resorcin, diluted as above (1 to 5), a solution of potassic nitrite of known strength is added; then a minute quantity of resorcin is dropped into it, and the color produced—after the resorcin has had time to dissolve, which only takes a few seconds—is compared with that of the sample to which the test has been added. If it be deeper, it is only necessary to add to another portion of acid less of the potassic nitrite solution until the color produced equals that of the sample of acid under examination.

To those accustomed to work with the Nessler reagent in the estimation of ammonia in water analysis by Wanklyn's method, measuring the amount of nitrous compounds in oil of vitriol by this method will be easy enough. I use small nesslerizing glasses, 10 Cm. long and 1.5 Cm. broad, the same as recommended by Wanklyn when operating on small quantities of water.

Half a dozen of these glasses, which can be obtained of most dealers in chemical apparatus, are sufficient to work with.

Any one using this test will find it extremely easy. Besides, it is much more convenient to work with 1 C.c. of a corrosive acid like sulphuric acid than with 20 C.c.

The author next gives a practical illustration of the working of the test, and the calculation of the results:

One C.c. of a certain acid, diluted 1 to 5, was treated with resorcin, as above directed, in one of the small nesslerizing glasses placed on a white porcelain tile, and the color produced by the reaction of the nitrous compound on the resorcin noted. Into another glass containing 1 C.c. of *pure* sulphuric acid (diluted 1 to 5) 1 C.c. of a solution of potassium nitrite was run from a pipette, a minute quantity of resorcin added, and the color produced compared with that of the sample. In this case it was much deeper than the sample, although, as in nesslerizing, it is easy to hit the right shade in practice. To three other glasses, each containing 1 C.c. of pure acid diluted with water, smaller quantities of the potassium nitrite solution were added in the same manner. It was found that one-fifth C.c. of the nitrite solution was sufficient to produce the same tint. One-fifth of a cubic centimeter equals 0.1 Mgm. of nitrite of potassium, whence an easy calculation gives the percentage of nitrous compounds as $N_2O_3$ [nitrous anhydride] or $HNO_2$ [nitrous acid].

Calculated as nitrous acid ($HNO_2$), 96 parts of nitrite of potassium ($KNO_2$) correspond to 47 parts of nitrous acid ($HNO_2$); hence 0.0001 Gm. of the nitrite corresponds (nearly) to 0.000049 Gm. of nitrous acid.

The spec. grav. of the acid under examination was found to be 1.734 at 60° F. One C.c. of the acid would weigh 1.734 Gm.

Hence $0.000049 \times 100 \div 1.734 = 0.0028$ p. c. of nitrous acid ($HNO_2$).

[We have preferred to write the author's figures in grammes and milligrammes rather than as fractions of the latter.—ED. AM. DR.]

It may be observed that there is nothing particularly new in the reaction which takes place when nitrous compounds are added to resorcin. It is made use of in the synthesis of different dyes, and the reaction is familiar enough to those who have practically studied the chemistry of the benzene derivatives. Besides yielding dyes with nitrous acid, resorcin, when heated with phthalic anhydride, is converted into fluoresorcin. . . . It was the above-mentioned reaction that led me to try it as a test for nitrous compounds in oil of vitriol, and I think it will be found equally convenient for testing spirit of nitre, and for estimating the amount of nitrous ether contained in it. It will be far easier to estimate the ethyl nitrite with resorcin than by the usual method involving the use of a nitrometer, which every pharmacist does not possess.

I venture to think that resorcin will be found a useful test to those who have occasion to examine sulphuric acid for aërated-water manufacturers and others. Besides, there are many compounds, in the production of which sulphuric acid is used, where the presence of nitrous compounds is objectionable and in some cases inadmissible. In these cases the resorcin test will be found specially useful. [The test is of no use for nitrates; hence we have avoided using the term "nitrogen compounds," here and there used by the author, and have substituted "nitrous compounds" in place of it.—ED. AM. DRUGG.]

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**Preparation of Absolutely Pure Hydrosulphuric Acid.**—In a flask provided with a safety tube, mix 1 part of sulphide of calcium and 2 parts of chloride of magnesium, with enough water to make a thin magma, and connect the flask with a wash bottle containing distilled water. On heating the flask, hydrosulphuric acid is given off in accordance with the following reaction:

I. $MgCl_2 + x\,H_2O = Mg(OH)_2 + 2HCl + (x-2)\,H_2O$
magnesium chloride. water. magnesium hydrate. hydrochloric acid. water.

II. $2HCl + CaS = CaCl_2 + H_2S$
hydrochloric acid. calcium sulphide. calcium chloride. hydrosulphuric acid.

Since the reaction mentioned under I. takes place only when the liquid is heated, the evolution of hydrosulphuric acid ceases when the source of heat is withdrawn.—J. HABERMANN in *Chem. Zeit.*

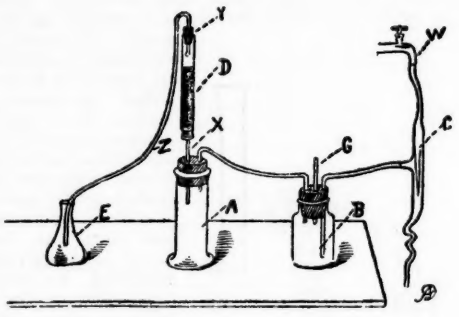
## A GENERAL METHOD FOR DETERMINING THE EXTRACTIVE IN CRUDE DRUGS.

MR. A. L. JOHNSON gives the following directions for readily determining the extractive matters in crude drugs, in a recent issue of the *Druggists' Bulletin:*

D is a piece of inch-bore glass tubing, 7 or 8 inches long, which contains the drug to be exhausted, and is connected by the glass tube X with the graduated receiving bottle A. C represents the suction apparatus attached to the water tap W, and may consist of a Bunsen or Sprengel's air pump, or any other convenient form of aspirator. B serves both as a safety bottle to intercept the back flow of water at times of varying pressure, and as a point of attachment for duplicates of the apparatus A—D when it is desirable to have them. To this end, the stopper should be fitted with suitable tubes and caps (G).

The *modus operandi* of the apparatus, as will readily be anticipated, rests on the exhaustion of the air from A, to replace which the menstruum from E is drawn up the rubber tube Z, and thence down through the closely packed drug in D to the receiver below.

The operation itself may be described as follows:




A dozen or more of the glass cylinders D, the number to suit the requirements of the operator, are provided with tightly fitting corks. Ten Gm. of the drug, in a state of fine powder, are transferred to one of these cylinders, a cork having been previously inserted. About 30 C.c. of the proper menstruum are then measured in, the second cork inserted tightly, and the cylinder given a thorough shaking. The drug in this condition is allowed to macerate, with occasional agitation, until it is thoroughly saturated. This point may be reached most readily and quickly by placing the tightly corked cylinders in the sand tray of a steam bath where they will be subject to a moderate heat.

When the maceration is thus completed, the corks are removed one at a time, and tufts of absorbent cotton placed in either end of the cylinder. Now one of the corks is replaced by the perforated stopper carrying the tube X, which latter is at once inserted in the stopper of the receiving bottle A, as shown in the cut. Having made all the joints tight (only rubber stoppers should be used), the aspirator is started and the liquid used in maceration is completely drawn from the drug, which, now nearly dry, is pressed as tightly as possible in the cylinder. The stopper Y is then inserted, and the apparatus allowed to feed itself until exhaustion is complete or the required amount of menstruum (100 C.c.) has passed through the drug. Of the tincture thus formed, 10 C.c. are evaporated to a constant weight at 105° C., and the residue calculated as the extractive in 1 Gm. of drug.

This method has been applied with success in the extraction of aconite and conium leaves, and golden seal, when a 50 per cent alcoholic menstruum was taken. Rhubarb, henbane, stramonium, and belladonna leaves were satisfactorily exhausted with 66 per cent alcohol, and the same may be said of aconite, hellebore, and cannabis indica, when 94 per cent alcohol was employed.

With some of these drugs the complete operation of estimating the extractive was performed by this method in less than 48 hours—a result not readily attained by percolation.

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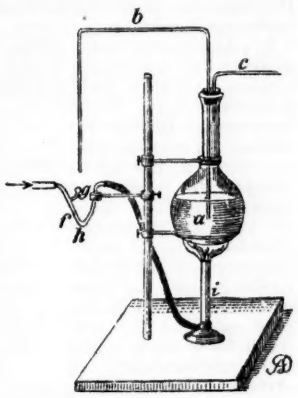
**Hydrosilico- and Hydroboro-fluoric Acids as Antiferments.**—Mr. F. J. Homeyer, of Frankfort-on-the-Main, announces (in *Pharm. Zeit.*, 1889, Dec. 14th) that he has found both hydrosilicofluoric and hydroborofluoric acids to possess decided antifermentative properties. On adding 0.1 to 0.5 per cent of hydrosilicofluoride of calcium, or of a soluble salt of hydroborofluoric acid, to a solution containing 10 per cent of glucose and 5 per cent of yeast, neither fermentation nor any other change takes place. Grape juice mixed with 0.2 per cent of the calcium salt behaves in the same manner.

Starch paste treated thus likewise remains unaltered. The author proposes to study the action of these acids more in detail, and promises further report.

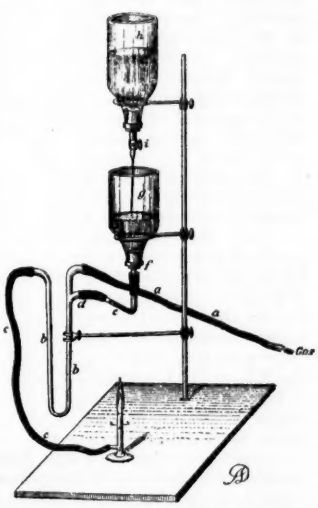
## AUTOMATIC CUT-OFF FOR GAS.

THE automatic cut-off for gas here described is intended, primarily, for operations where the moment when the supply of gas is to be stopped can be determined by the rate at which a liquid evaporates. For instance, the flask *a* having been partly filled with water, it will be easy to determine, experimentally, about how much time will be required to cause the water contained in it to boil down to any given depth by the full flame afforded by the burner *i*. Supposing it has been ascertained that from the level at which the water stands in the cut, down to the orifice of the inner leg of the tube *b*, one hour's boiling is sufficient. This, then, will be the time required to dissipate that much liquid by boiling. And in a similar manner other periods of time may be fixed by experiment.

Now the designer of the apparatus, Felix Bauer, proposes to use it for shutting off the supply of gas to its *own* burner. As long as the inner leg of *b* is below the surface of the liquid the steam will escape through *c*. When the orifice of the inner leg of *b*, however, becomes exposed, steam will also pass through the whole tube *b*, and at its outer orifice will play upon a small expansion of a V-shaped glass joint in the gas supply, containing a little mercury and a few drops of ether in a trap. The steam playing upon the ether causes this to develop vapor under pressure; this projects the mercury into the V-shaped tube, where it stops up the capillary channel at *h*, thus shutting off the supply of gas. —After *Chem. Centralbl.* (from *Chem. Zeit.*).




*Note by Ed. Am. Drugg.*—The apparatus may also be used for shutting off a supply of gas conducted to *other* apparatus, *besides* its *own supply*. For this purpose it is only necessary to have another twice-bent tube, similar to *b*, which is not quite as deeply pushed down into the contents of the flask as *b*. The outer leg of this extra tube is adjusted, just as shown in the cut, over a mercury trap in the gas conduit leading to the *other* apparatus, which it will cut off at the proper time. A little later the tube *b* will come into action, and shut off the gas supply of the flask *a*.

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Another cut-off, in which the time required for a given volume of water to flow off in drops is the means of adjusting the moment of interrupting the gas supply, is proposed by Luzi. The apparatus is easily intelligible from the cut. It may be stated that *g* and *h* are two plain bottles with bottom cut off, and *i* is a glass stop-cock fitted into the stopper of *h*. At *d* a lateral tube is attached, the portion at *e* being quite narrow and having a drop of mercury placed in the bend. The tube *b* is preferably made quite long, so that it may be large enough to hold the liquid which will be driven into it at the decisive moment.

The drop of mercury in the bend of the tube *e* evidently requires a given force to be projected forward through the capillary tube. This force is equal to a certain weight of water, which may easily be ascertained by experiment. And at the same time it may be ascertained how long a time is required, at a certain position of the stop-cock *i*, until the amount of water required to push forward the drop of mercury has collected in the vessel *g*. Supposing it is ascertained that it takes just 1 quart of water to project the drop of mercury, then it is within the choice of the operator how long a time he will give that quart of water to drop into the vessel *g*. Of course he will have to determine this time by experiment.—After *Chem. Centralbl.*

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**Novel Show Bottle.**—A Liverpool apothecary has substituted a glass percolator and receiver for the usual show bottle, filling the upper part of the percolator with a red solution and the receiver with a blue one, the gas jet being placed behind in the usual manner.

## USE OF THE NITROMETER FOR ASSAYING VARIOUS CHEMICALS.

We have repeatedly described the so-called nitrometer and its application in the quantitative analysis of urea, spirit of nitre, and other chemical substances (see, for instance, our vol. for 1889, p. 63; 1888, 155, etc.). Prof. G. Lunge, to whom most of the credit connected with this method is due, has recently made further contributions to its practical application, particularly in the assay of chlorinated lime, manganese dioxide, and potassium permanganate.

We must, of course, assume that the nitrometer, in its usual form, is known to the reader. Those who lack this knowledge ought to consult our volume for 1888, 155, and particularly 1886, page 71. The apparatus described in the last-named article is here again illustrated for the sake of rendering the subsequent explanation more intelligible (see Fig. 4).

Prof. Lunge's recent paper first treats of the relative degree of accuracy attainable by the nitrometer method. He communicates results regarding the assay of the three substances above mentioned.

1. *Chlorinated Lime.*—This is estimated by means of peroxide of hydrogen, which must for this purpose be rendered alkaline by the addition of solution of soda. It is not necessary to be very exact in this addition. It may be added until a flocculent precipitate begins to appear, but too large an excess must be avoided. Each separate portion of the peroxide must be thus rendered alkaline before use, and the peroxide itself must not be too concentrated. A strong peroxide (say over 5 Gm. $H_2O_2$ in 100 C.c.) produces results which are a little too high. The best strength is 2 Gm. of $H_2O_2$ in 100 C.c., or even less.

Fig. 1.

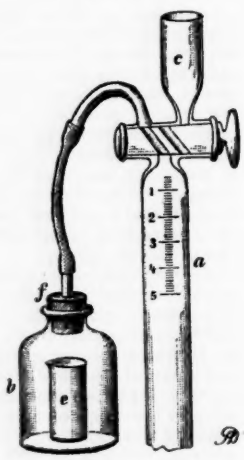



Fig. 2.

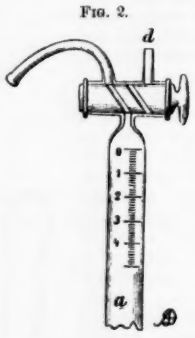



Fig. 3.

Lunge's process has the additional advantage that the strength of the peroxide itself may be easily determined within a few minutes by decomposing a measured quantity of it in the nitrometer with an excess of chlorinated lime of any (although unknown) strength. If 1 C.c. of the peroxide gives off not more than 7 C.c. of oxygen—half of which, of course, is due to the chlorinated lime, according to the equation, $H_2O_2 + CaOCl_2 = H_2O + CaCl_2 + O_2$—then the peroxide is about of the right strength. While too great a strength of the peroxide must be avoided, it makes no difference if the peroxide (if of proper strength) is used in excess—for instance, if 10 C.c. are used instead of 7 C.c. The only necessary condition is that it shall not be too concentrated nor too alkaline.

An important point to be observed is not to delay any longer than necessary in taking the reading of the scale, since the undecomposed peroxide of hydrogen itself will gradually evolve oxygen.

In estimating chlorinated lime, it has been ascertained that the nitrometer method may be applied both to clear and to still turbid solutions without producing error.

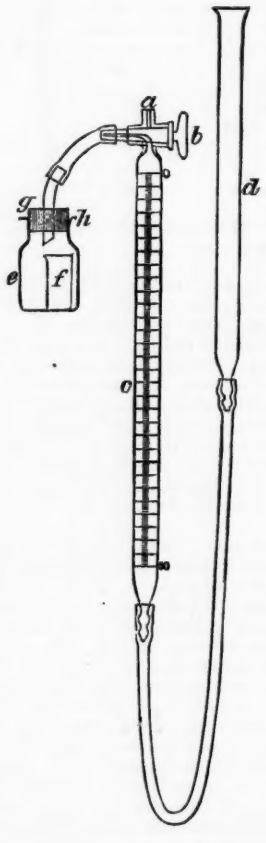
In making the estimations described by the author, the latter recommends to use simply water as tampon instead of mercury, since the gas or gases evolved are just as feebly soluble in the former as they are in the latter.

While any of the various forms of nitrometer may be employed for these assays, the author gives some practical hints which render the choice of one or the other form preferable in certain cases. Probably the form shown in Fig. 1 is the one most universally applicable. In this the decomposition of the reacting substances may either be accomplished within the measuring tube (*a*) itself, or it may be brought about in the attached bottle *b*, the bore of the glass stop-cock being so arranged that communication can only be established with either *c* or *b* at one and the same time. In many cases there is no need of the cup-shaped attachment *c* (of Fig. 1). In such cases the forms shown in Figs. 2 and 3 are suitable. It will be noticed that in one of these new forms the graduation does not begin with the stop-cock itself, but a little below it (0). This is for the reason that it is more easy to adjust the level of the tampon liquid to the mark 0, which is clearly seen, than to the exact bottom of the stop-cock, which it is sometimes hard to distinguish.

In Fig. 3, a bulb interposed between the stop-cock and the measuring tube proper permits the measurement of a rather large volume of gas.

Assuming we had to make an assay with the apparatus shown in Fig. 1. First the two tubes (see Fig. 4) are filled with water until the latter reaches the mark 0 in the tube *a* (*c* in Fig. 4), when the two tubes are so adjusted that the water in both stands on the same level. Then the stop-cock is closed. Next a sufficient quantity of peroxide of hydrogen is poured into the small tube *e* (Fig. 1; *f* in Fig. 4), and the exactly measured quantity of chlorinated-lime solution into the bottle *b*, outside of the tube *e*. When manganese dioxide is to be estimated, this is likewise put into this place. The stopper *f* is now inserted, and, by careful adjustment of it, the level of the liquid in the measuring tube (which had been depressed on first inserting the stopper) exactly readjusted at the mark 0. Care must be taken, throughout the operation, not to touch the bottle *b* more than necessary with the hand, in order to avoid warming and expanding the contents. When it is ascertained that the level of the liquid in the two tubes remains constant, the faucet is opened so as to bring the bottle in communication with the nitrometer, and once more it will be necessary to see that the former level is preserved or restored. By inclining the bottle *b*, the peroxide is made to flow from the tube *e* upon the chlorinated-lime solution (or other substance to be acted upon), and will develop gas which displaces liquid in the graduated tube. Previously, however, it is necessary to lower the compensation (or ungraduated) tube (see Fig. 4), so as to avoid the production of any pressure. When no more gas is given off, the two tubes are readjusted until the liquid in both is at the same level, and the space displaced in the graduated tube at once read off. If care has been taken not to warm any part of the apparatus by contact with the hands, there is no need of waiting. In fact, waiting is apt to vitiate the results. If the latter are required to be accurate, it is necessary to take into consideration both the thermometer and the barometer. These may, however, be avoided if another nitrometer is at hand which had previously been charged with a certain quantity of reagents which had given off a known volume of gas. The expansion or contraction of the latter, under varying conditions of temperature or pressure, affords a ready method of correcting the results obtained upon unknown material.

Fig. 4.




When operating upon chlorinated lime, it is best to arrange the proportions so that the result at once indicates the percentage of available chlorine. For this purpose, 20 Gm. of chlorinated lime are dissolved in water to make 500 C.c. Each cubic centimeter of oxygen developed, after reduction to 0° C. and 760 Mm., will then be = 0.003167 Gm. (or 0.3167 per cent) of chlorine. If 25 C.c. of this (corresponding to 1 Gm. of chlorinated lime) are taken, a bulb nitrometer graduated to 140 C.c. must be employed. If one graduated only to 50 C.c. is available, only 5 C.c. of the above solution must be taken, in which case, of course, each cubic centimeter of oxygen corresponds to 5 × 0.3167 Gm. or 1.58 per cent of chlorine. Still more convenient will it be to dissolve 7.917 Gm. of chlorinated lime in 250 C.c. of water, and to use for each test 10 C.c. of the turbid liquid. Each cubic centimeter of oxygen corresponds then to 1 per cent of available chlorine. A 50 C.c. tube is sufficient for this purpose.

2. *Manganese Dioxide.*—In estimating this, it must be reduced to the finest possible powder and put into the bot-

tle *b*, outside of the tube *e*. Before the latter is placed in, some dilute sulphuric acid is poured on the oxide and well agitated with it to decompose any carbonates that may be present. In this case the reaction takes place in acid solution:

$$MnO_2 + H_2O_2 + H_2SO_4 = MnSO_4 + 2H_2O + O_2$$

Since only one-half of the oxygen is derived from the peroxide, each cubic centimeter of oxygen corresponds to 0.003897 Gm. of manganese dioxide. Therefore, if 0.3897 Gm. of the dioxide are weighed out for each test, the number of cubic centimeters of oxygen given off will at once indicate the true percentage of pure $MnO_2$.

3. *Potassium Permanganate.*—It is often necessary to determine the titer of a volumetric solution of the salt, since it cannot be kept long without change. This may be rapidly done by means of peroxide of hydrogen in presence of a rather large quantity of free sulphuric acid. The oxygen given off consists of the whole that is available for oxidation both from the permanganate and the peroxide.

Prof. Lunge adds a remark to his paper which deserves general attention, as it implies a lesson often neglected. He says: "It is scarcely necessary to say that this, like any other analytical method, requires a certain amount of practice, if absolutely reliable results are expected. If any one should suppose that he should obtain perfectly correct results at the very first trial, perhaps with an untested nitrometer and other unverified measures, and in a room subject to changes of temperature, he will find himself deceived, but not any more so than would have been the case had he practised other analytical methods heretofore unfamiliar to him."—After *Zeitschr. f. angew. Chem.*

[ORIGINAL COMMUNICATION.]

## UREA TABLE.

SINCE the estimation of urea in urine by means of Lunge's nitrometer has become a comparatively simple operation, occupying, after a brief practice, not more than about ten minutes, and as a number of physicians are now in the habit of making such determinations for purposes of diagnosis and treatment, it has been suggested to us that, if a table were constructed, reducing the amount of calculation to be performed by the physician to a minimum, the method would be still more used by the profession at large. In compliance with this suggestion, we present the following table, which is made, not for scientific, but for practical purposes, and regarding which the remarks here appended should be carefully noted.

1. It is presumed that the reader or operator is familiar with the method of decomposing urea by a hypobromite, whereby it is converted into nitrogen, carbonic acid, and water, the nitrogen being evolved as gas which is subsequently measured, while the carbonic acid is absorbed by the caustic alkali of the reagent. Those not familiar with the operation are referred to the AMERICAN DRUGGIST, 1889, page 63, and works on urinary analysis.

2. Perfectly correct results are obtained only under certain conditions, which are often beyond the control or facilities of the physician.

3. The theoretical formula for calculating the weight, in grammes, of urea from the volume of nitrogen evolved is as follows:

$$\frac{v\,(b - b')}{354.3 \times 760\,(1 + 0.003655\,t)}\,h$$

in which

h is the weight of urea in grammes;
v is the volume of the evolved nitrogen;
t is the temperature in centigrade degrees;
b is the barometric pressure in millimeters;
b′ is the tension of aqueous vapor at the temperature t.

The figures for b′ are generally given in form of a table comprising the usual temperatures at which such determinations are made. This table will be found in all treatises on gas analysis.

If the barometric pressure and tension of aqueous vapor be disregarded—which may be done without much error in any locality near the sea level—and if the volume of evolved gas be read off at 15° C. (59° F.), or as near to it as possible, then the above formula becomes:

$$\frac{v}{354.3 \times [1 + (0.003655 \times 15)]}$$

Now, by substituting 1 (that is, 1 C.c.) for v, and calculating the value of the fraction, we obtain 0.0027, which is the weight, in grammes, of 1 C.c. of nitrogen gas evolved under normal conditions.

4. The table below given is based upon this figure, and upon the assumption that normal conditions of temperature and barometric pressure prevail.

5. The whole of the nitrogen in the urea is never shown by the reaction, because a small quantity of nitrogen remains dissolved in the liquid. But the error may be disregarded if the liquid which is tested contains less than 1 per cent of urea; and even up to near 1.5 per cent it is not of material amount.

6. The more urea a urine contains the less accurate become the results of the assay, unless it is diluted so as to contain about 1 per cent of urea.

7. It is, therefore, best, when some accuracy is required, to obtain an approximate idea of the amount of urea by a preliminary assay, then to dilute the urine so that it will contain from 0.5 to 1 per cent of urea, and to repeat the test.

8. If daily or periodical examinations of the urine of one and the same person are undertaken, the preliminary assay may be omitted. All the results will be affected with an error, but this will run uniformly through the series, and will not prevent any decrease or increase of urea from being readily recognized.

N. B.—As the quantity of urea likely to be encountered in any urine does not go below 0.8 per cent nor beyond 6 per cent, all figures corresponding to values outside of these limits have been omitted from the table.

The three columns giving the number of grammes of urea in 100 C.c. may also be utilized to calculate the percentage of urea per weight. For this purpose it is only necessary to take the specific gravity of the urine, and to divide with it the number of grammes given in the table. For instance, supposing 2.5 C.c. of urine should have evolved 18 C.c. of nitrogen, then we find from the table that 100 C.c. of the urine contained 1.944 Gm. of urea. If the true percentage is wanted, supposing the urine has a specific gravity of 1.030, we divide 1.944 by 1.030 and obtain 1.887.

UREA TABLE.

| C.c. of nitrogen evolved. | Amount of Urine taken for Analysis. 1 C.c. Correspond to urea in 100 C.c. of urine. | 1 C.c. Correspond to urea in 1 fl. oz. of urine. | 2.5 C.c. Correspond to urea in 100 C.c. of urine. | 2.5 C.c. Correspond to urea in 1 fl. oz of urine. | 5 C.c. Correspond to urea in 100 C.c. of urine. | 5 C.c. Correspond to urea in 1 fl. oz. of urine. |
|---|---|---|---|---|---|---|
| 5 | 1.35 Gm. | 6.5 Gr. | — | — | — | — |
| 6 | 1.62 " | 7.38 " | — | — | — | — |
| 7 | 1.89 " | 8.61 " | — | — | — | — |
| 8 | 2.16 " | 9.84 " | 0.864 Gm. | 3.936 Gr. | — | — |
| 9 | 2.43 " | 11.07 " | 0.972 " | 4.428 " | — | — |
| 10 | 2.70 " | 12.3 " | 1.080 " | 4.920 " | — | — |
| 11 | 2.97 " | 13.53 " | 1.188 " | 5.412 " | — | — |
| 12 | 3.24 " | 14.76 " | 1.296 " | 5.904 " | — | — |
| 13 | 3.51 " | 15.99 " | 1.404 " | 6.396 " | — | — |
| 14 | 3.78 " | 17.22 " | 1.512 " | 6.888 " | — | — |
| 15 | 4.05 " | 18.45 " | 1.620 " | 7.380 " | 0.810 Gm. | 3.690 Gr. |
| 16 | 4.32 " | 19.68 " | 1.728 " | 7.872 " | 0.864 " | 3.936 " |
| 17 | 4.59 " | 20.91 " | 1.836 " | 8.364 " | 0.918 " | 4.182 " |
| 18 | 4.86 " | 22.14 " | 1.944 " | 8.856 " | 0.972 " | 4.428 " |
| 19 | 5.13 " | 23.37 " | 2.052 " | 9.348 " | 1.026 " | 4.674 " |
| 20 | 5.40 " | 24.6 " | 2.160 " | 9.840 " | 1.08 " | 4.920 " |
| 21 | 5.67 " | 25.83 " | 2.268 " | 10.332 " | 1.134 " | 5.166 " |
| 22 | 5.94 " | 27.06 " | 2.376 " | 10.824 " | 1.188 " | 5.412 " |
| 23 | — | — | 2.484 " | 11.316 " | 1.242 " | 5.658 " |
| 24 | — | — | 2.592 " | 11.808 " | 1.296 " | 5.904 " |
| 25 | — | — | 2.7 " | 12.3 " | 1.35 " | 6.150 " |
| 26 | — | — | 2.808 " | 12.792 " | 1.404 " | 6.396 " |
| 27 | — | — | 2.916 " | 13.284 " | 1.458 " | 6.642 " |
| 28 | — | — | 3.024 " | 13.776 " | 1.512 " | 6.888 " |
| 29 | — | — | 3.132 " | 14.268 " | 1.566 " | 7.134 " |
| 30 | — | — | 3.24 " | 14.760 " | 1.62 " | 7.380 " |
| 31 | — | — | 3.348 " | 15.252 " | 1.674 " | 7.626 " |
| 32 | — | — | 3.456 " | 15.744 " | 1.728 " | 7.872 " |
| 33 | — | — | 3.564 " | 16.236 " | 1.782 " | 7.618 " |
| 34 | — | — | 3.672 " | 16.728 " | 1.836 " | 8.364 " |
| 35 | — | — | 3.780 " | 17.220 " | 1.890 " | 8.610 " |
| 36 | — | — | 3.888 " | 17.712 " | 1.944 " | 8.856 " |
| 37 | — | — | 3.996 " | 18.204 " | 1.998 " | 9.102 " |
| 38 | — | — | 4.104 " | 18.696 " | 2.052 " | 9.348 " |
| 39 | — | — | 4.212 " | 19.188 " | 2.106 " | 9.594 " |
| 40 | — | — | 4.320 " | 19.680 " | 2.160 " | 9.840 " |
| 41 | — | — | 4.428 " | 20.172 " | 2.214 " | 10.086 " |
| 42 | — | — | 4.536 " | 20.664 " | 2.268 " | 10.332 " |
| 43 | — | — | 4.644 " | 21.156 " | 2.322 " | 10.578 " |
| 44 | — | — | 4.752 " | 21.648 " | 2.376 " | 10.824 " |
| 45 | — | — | 4.860 " | 22.140 " | 2.430 " | 11.070 " |
| 46 | — | — | 4.968 " | 22.632 " | 2.484 " | 11.316 " |
| 47 | — | — | 5.076 " | 24.124 " | 2.538 " | 11.562 " |
| 48 | — | — | 5.184 " | 23.616 " | 2.592 " | 11.808 " |
| 49 | — | — | 5 292 " | 24.108 " | 2.646 " | 12.054 " |
| 50 | — | — | 5.3 " | 24.600 " | 2.650 " | 12.300 " |

"Gm." = Gramme; "Gr." = Grain.

**Quinoline as a Preservative.**—At the Erlangen Physiological Laboratory the following formula is adopted: Quinoline, 5 Gm.; sodium chloride, 6 Gm.; glycerin, 100 Gm.; water, 900 Gm. Ordinary tar quinoline can be used. The liquid is said to have the property of preserving all the tissues in their natural condition, excepting the removal of all coloring matter.

Quinoline is also said to bea convenient preservative for digestive liquids; an addition of the salicylate, while preventing putrefaction, does not interfere with the activity of the digestive ferments.—*Pharm. Journ.*

### Glyco-Gelatin.

AT a recent pharmaceutical meeting held at Liverpool, Mr. T. S. Wokes read a paper on "Glyco-gelatin," which is the name given to a compound used in the throat hospitals for preparing medicated pastilles. Following is a portion of the paper (after *Pharm. Journ.*):

The term "glyco-gelatin" is the name given in the Throat Hospital Pharmacopœia to the bases there ordered for making their official pastilles.

For the purposes of this paper I propose to apply the term glyco-gelatin [we have changed the author's spelling of "glycerine" and "gelatine" to "glycerin" and "gelatin."—ED. AM. DRUG.] more generally to other combinations containing glycerin and gelatin (with water) than the T. H. formula, which is:

| | |
|---|---|
| Refined Gelatin | ℥ i. |
| Glycerin (by weight) | ℥ iiss. |
| Orange Flower Water | ℥ iiss. |
| Sol. Carmine | q. s. |

The gelatin is soaked in the water for two hours, then heated in a covered water-bath until dissolved, the glycerin added, the two stirred well together, and the whole strained through muslin. Wring out in hot water, and when sufficiently cooled the coloring is added.

It is easy to make, taking (including the two hours' soaking) about two and one-half hours, and possesses good keeping properties. I have had samples over twelve months, and they were then still fresh and nice.

To convert this into pastilles, cut off ℥ i., melt in a small water-bath, add the medicament, previously rubbed up with a few drops of glycerin, and pour into an oiled tray, and when cold divide into twenty-four pastilles. The tray which I use is the lid of an ordinary 4-ounce tin lozenge box, and also, to insure reasonable accuracy in the cutting, I use a piece of card, on the surface of which there are the outlines of the exact size of the sheet of pastilles when turned out of the mould. On the outside of these lines there are short lines dividing it into the required number of pastilles. I use an ordinary table knife for cutting.

There are other methods of cutting the pastilles.

Mr. Wyatt recommends and uses a square tin mould 3x3 inches, divided into squares by means of deeply impressed lines on the under surface.

Another method is given in the "Art of Dispensing," somewhat similar to the last, but possesses the advantage that it is available for varying quantities. It consists of a piece of plate glass with three small pieces cemented on its three sides, the fourth being left open, for which a movable piece of glass is provided; the whole surface is divided into squares by means of grooved lines, and the loose piece of glass is moved up to any series of squares required and secured in its place by means of a cork.

The following pastilles are official in the Throat Hospital Pharmacopœia:

| | |
|---|---|
| Acid, Boracic | grains ij. |
| Acid, Carbolic | grain ¼ |
| Ammonium Chloride | grains xi. |
| Bismuth Subcarb. | " iij. |
| Bismuth, grains iij., and Morph. Acet. | grain 1/10 |
| Bismuth, grains iij., and Pot. Chlorate. | grains ij. |
| Iodoform | grain i. |

Quoting from the Extra Pharmacopœia as to the advantages of glyco-gelatin for administering these and other medicines, it affords a ready means of prescribing lozenges to meet individual cases, and pastilles are specially suited to cases of inflammation of the tongue and palate, and their gelatinous nature gives much relief in dryness of the throat. I have here some pastilles:

| | |
|---|---|
| Cocainæ Hydrochlor. | gr. ¼ |
| Acid. Hydrochlor. dil | ♏ ½ |

and flavored with essence of lemon. The acid is added to overcome in some degree the sweetness of the glycerin.

Having noticed that the official pastilles containing ammonium chloride are slightly moist, I thought a stiffer basis might overcome this objection, and I made one, but it was not a success.

The coloring used for the glyco-gelatin is generally an ammoniacal solution of *carmine*, and Mr. Wyatt in his paper gives the following formula for making it, which I find well suited to the purpose:

| | |
|---|---|
| Carmine | grains xxx. |
| Water of Ammonia | q. s. |

Dissolve the carmine in ʒ vi. of the ammonia, filter, and wash the filtrate with sufficient water to collect ℥ i. of the coloring. I have used another coloring, viz., *liquid saffron*, which I made as follows:

| | |
|---|---|
| Saffron | grains xxx. |
| Boiling Water | q. s. |
| Alcohol | ʒ i. |

Pour about 1 ounce of boiling water on the saffron, infuse until cold, filter, press the marc, add the alcohol and any necessary water to make ℥ i. About 5 minims of this added to an ounce of the mass give a good tint.

The subject of flavoring is rather a wide one; many different substances may be added where suitable. Ext. glycyrrh. liq., or, better still, glycyrrhizin, suggests itself as an admirable thing for covering the taste of chloride of ammonium; the fruit juices would in many cases be admirable substitutes for the orange-flower water used in making the basis.

I must not omit to mention tolu, the efficacy of which valuable medicine would in no way be impaired by being exhibited in the form of pastilles.

I have also used the essences of lemon, vanilla, and almonds for flavoring at various times.

### New Antipyretics.

SOME particulars have been published concerning two more new compounds alleged to possess antipyretic properties, which have been prepared by Prof. Michaelis (*Pharm. Centralh.*, January 16th, page 35). One of them is called acetyl-ethylene-phenyl-hydrazin, and is said to be obtained by acetylizing ethylene-phenyl-hydrazin, which itself is formed by the action of ethylene bromide upon sodium-phenyl-hydrazin. It is described as occurring, when crystallized from alcohol, in colorless needles, melting at 220° C., and having the composition represented by the formula

$$C_2H_4.N_2.2[C_6H_5.N.H(CO.CH_3)]$$

The ether compound is called ethylenephenylhydrazin-succinic acid. It is said to be obtained by dissolving equal parts by weight of ethylenephenylhydrazin and succinic anhydride in alcohol, and boiling; from the liquid, which is clear at first, the acid quickly separates under strong ebullition and in such abundance that the liquid solidifies to a paste. This acid is described as being soluble in alcohol, and as crystallizing in needles that melt at 203° C.—*Pharm. Journ.*

### Lister's Double Cyanide Gauze.

SIR JOSEPH LISTER, in the *Lancet* of January 4th, 1890, describes the method of preparing his new surgical dressing thus: Cyanide of potassium, cyanide of mercury, and sulphate of zinc are mixed together in solution in quantities proportioned to their atomic weights; the cyanide of potassium and cyanide of mercury being dissolved together in 1½ ounces of water for every 100 grains of potassium cyanide, and added to the sulphate of zinc dissolved in three times that amount of water. The precipitate is collected on a strainer, and when well drained is washed with two successive portions of water, equal in quantity to that used for the solution—viz., 6 ounces for every 100 grains of potassium cyanide; at least this amount of washing being essential in order to free the precipitate sufficiently from the highly irritating soluble salts which are associated with it in its formation. The precipitate having been thus washed and drained, but not dried, it is thoroughly diffused with pestle and mortar in distilled water (6 ounces for every 100 grains of potassium cyanide), containing in solution 1 part of hæmatoxylin for every 100 parts of the cyanide salt, the amount of which is known from the circumstance that the dry product of cyanide salt is almost exactly equal in weight to the potassium cyanide employed. Hæmatoxylin is readily soluble in a small quantity of hot water, and remains in solution when added to a large quantity of cold water. The cyanide salt, while it precipitates the hæmatoxylin, changes its color to a pale bluish tint. This is advantageously enhanced by the addition of a little ammonia to the mixture in the proportion of 1 atom of ammonia to each atom of hæmatoxylin. More than this proves prejudicial. The ammonia is added in a dilute form, and it is convenient to have the dilution such that 1 fluid-drachm of the ammoniacal liquid shall correspond to 1 grain of hæmatoxylin. The dye is further economized by allowing the ammoniated mixture to stand for three or four hours, and stirring it occasionally, so that the ingredients may react thoroughly upon each other. If the mixture is filtered immediately, there is considerable loss of coloring matter. The dyed salt, having been drained and dried at a moderate heat, is levigated, and may then be kept for any length of time. When employed for charging a dressing, it is diffused by means of pestle and mortar in solution of bichloride of mercury (1 to 4,000) in sufficient abundance to drench the fabric thoroughly, for which 4 imperial pints to 100 grains of the salt will be found adequate. This will give a percentage of between 2 and 3 of the cyanide to the dry gauze. The gauze should always be used moist; and if it be prepared for immediate use, the process of drying may be omitted, the gauze, after being hung up for a while to drain, being further deprived of superfluous moisture by placing it in a folded sheet. It may afterward be conveniently kept moist by wrapping it in a piece of mackintosh cloth. When obtained dry from the manufacturer, it should be moistened again with the weak corrosive sublimate before it is used.

### Hypophosphorous Acid.

THE Committee having in charge the Formulary of the British Pharmaceutical Conference have issued a four-page supplement, from which we select the formula for hypophosphorous acid, to which we have added the comments of the *Chemist and Druggist:*

Hypophosphite of Barium, containing not less than 95 per cent $Ba2(PH_2O_2).H_2O$.... .....8 oz.
Diluted Sulphuric Acid,
Distilled Water.....of each a sufficient quantity.

Dissolve the hypophosphite of barium in 36 fluidounces of hot distilled water. Add slowly to the solution 17½ fluidounces of diluted sulphuric acid, after which continue the addition, drop by drop, until no further turbidity is produced. Set aside in a warm place, and pass the clear liquid through a filter. Wash the precipitate by decantation with successive portions of hot distilled water until the washings have no longer an acid reaction. Filter, unite the filtrates, and evaporate the liquid on a water-bath to the prescribed density. The product will weigh about 11½ ounces.

*Characters and Tests.*—Colorless. Specific gravity 1.1367. Its strength, as determined by volumetric solution of soda, corresponds to 30 per cent of hypophosphorous acid. Its aqueous solution is not precipitated by diluted sulphuric acid, nor by an excess of ammonia, nor by oxalate of ammonia after neutralization, and gives not more than a faint opalescence with chloride of barium. If solution of ammonio-sulphate of magnesium be added after an excess of ammonia, no precipitate is produced. Chloride of calcium added to a neutralized solution yields no precipitate.

The prominence to which the various preparations of the hypophosphites have attained, and the favor with which they are regarded, have rendered necessary the introduction of hypophosphorous acid, and the committee wisely supply a formula for its preparation and tests for its purity. Regarding this acid there has been a lot of discussion, and hitherto finality has not been reached....

The various processes that have been suggested from time to time are all more or less faulty, the chief difficulty being solubility, to a greater or less extent, of the decomposition by-product in the acid. Of these a commonly used process is that which consists in the decomposition of calcic hypophosphite by oxalic acid, but the objection to this is that calcic oxalate is partly soluble in hypophosphorous acid. Calcic hypophosphite may also be decomposed by sulphuric acid, and this process is in use, we believe, by some makers; but a similar objection holds here, since calcic sulphate also remains in solution for a time, being ultimately deposited in a crystalline form. The United States National Formulary gives a formula which follows somewhat the lines of Fothergill's original process for making hydrobromic acid. Hypophosphite of potassium is dissolved in water, and tartaric acid in diluted alcohol; the two solutions are mixed, acid tartrate of potassium precipitated, and the filtrate contains the hypophosphorous acid. The alcohol is then evaporated off and the liquid made up with water.

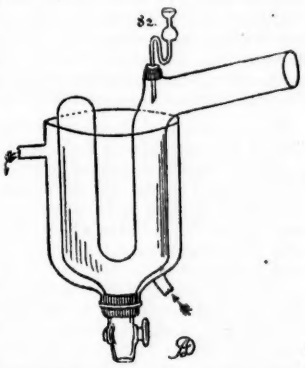
A modification of this process, in so far as the use of the alcohol is concerned, has been proposed in connection with the oxalic-acid process first mentioned, viz., by precipitating the calcic oxalate by means of alcohol, and evaporating off the spirit. All these processes have, we understand, been fully considered by the committee, and several of them tested both on the small and the manufacturing scales; but the committee have fallen back on the very safe plan of decomposing barium hypophosphite with sulphuric acid. The formula contains a barium salt containing 95 per cent of hypophosphite, and the proportion of dilute sulphuric acid is calculated on this basis. It unfortunately happens, however, that sometimes barium hypophosphite is less than 95 per cent—we have met with such samples, although they were specially bought as 95 per cent—and in cases such as these the quantity of dilute acid ordered would be slightly in excess. Seventeen fluidounces would be better than 17½ in the first instance, and then add the remainder of the acid gradually. The process is tedious, but it gives a very satisfactory acid, which corresponds in acidity and specific gravity, and it is more free from impurity than any we have met with made by another process.

### Antipyrine and Chloral Hydrate.

A FEW months since (AMER. DRUGG., 1889, page 170) M. Blainville reported that when antipyrine and chloral hydrate are dispensed together, an oily liquid is formed, in which crystals are subsequently found possessing the taste of neither the one nor the other compound. This statement is confirmed by Ludwig Reuter, who has made a closer investigation of the crystals as to their nature (*Apot.-Zeit.*, January 25th, page 45). They were found to be only slightly soluble in cold alcohol, ether, or chloroform, a little more soluble in boiling alcohol and boiling water, and totally odorless and tasteless. When treated with cold caustic soda solution there was no separation of chloroform, while with ferric chloride there was only a slight yellow coloration, not at all the characteristic red of antipyrine. Upon heating the crystals with caustic soda solution decomposition took place, traces of chloroform being at first given off and then much isonitril, together with a separation of antipyrine and its decomposition products; the acidulated liquid then gave an intense red color with ferric chloride. Nitrous acid had no effect upon the crystals in the cold, the characteristic blue-green of isonitrosoantipyrine not being produced. It would appear, therefore, that from antipyrine and chloral hydrate a rather stable compound is formed, described by Reuter as "trichloral-dehydphenyl-dimethyl-pyrazol," with which composition he considers the results of his analyses to have been in accord. He states that the same compound is also easily obtained upon heating together chloral hydrate and antipyrine to 115° C., and that it crystallizes from alcohol in dense scales. Upon rabbits the new compound failed to produce the effects characteristic of either of its constituents, and as far as the experiment went it appeared to be a therapeutically indifferent body.—After *Pharm. Journ.*

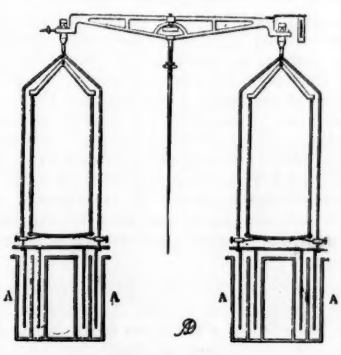
### A NEW CONDENSER.

C. SCHLARB some time ago proposed a new form of condenser which serves, at the same time, as a receiver. It consists of a U-shaped tube with inlet for receiving the end of the neck of the retort, an outlet provided with stop-cock, and a tubulure provided with a safety tube. The U-tube stands in a vessel in which a stream of cold water is kept circulating.—*Chem. Zeit.*



### AN IMPROVED BALANCE.

FOR the purpose of enabling the operator to weigh with greater celerity without impairing accuracy, P. Currie proposes to employ balances in which the scale pans are brought to a speedy rest by friction with air. The substance to be weighed being put on one scale pan, sufficient weights are put upon the other to restore the equilibrium within 0.200 Gm. When the balance has then come to rest, which requires only about two swingings, the deviation of the index from the centre is read off on a scale or vernier, and the weight within the 0.200 Gm. thus determined. A specially prepared scale,



reduced from an enlarged one by photography, and a microscope enable the operator to read off the weight within one-tenth milligramme.

The pan arrest is constructed after the plan shown in the cut. Each scale pan has attached to its under surface two concentric brass (or other metallic) cylinders, which play, without friction or contact, within the space left by corresponding cylindrical walls in a vessel below (A). The arrest of the pans is caused merely by the friction of air.—*Zeitsch. anal. Chem.*, 1890, 61.

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**A New Reagent for Sugar.**—At a recent sugar meeting of the Mulhouse Industry Society, M. Matthieu-Plessy described a new reagent for cane sugar, grape sugar, and pyrogallic acid, consisting of a solution of lead paranitrate ($PbHNO_4$) in an excess of melted ammonium nitrate (*Mon. Scient.*, Dec., page 1446). It is prepared by melting 54 parts of ammonium nitrate and adding to it 34 parts of lead nitrate and 21 parts of lead hydrate. The reagent melts at about 115° C., and in contact with glucose it gives a cherry-red color; with cane sugar the color of *café-au-lait;* and with pyrogallic acid a chrome-green color.—*Pharm. Journ.*

### Artificial Digestion.

In the course of a paper treating of the artificial digestion of proteids, with particular reference to those existing in the usual kind of fodder for animals, Prof. Stutzer gives directions for preparing permanent solutions of pepsin and of pancreatin, also useful hints which are apt to facilitate the tedious filtration of peptic or pancreatic albuminoid solutions.

Before he treats a sample of fodder with the digestive ferment, he subjects it, in fine powder contained in a bag of filtering paper, to the action of ether, in an extraction apparatus, during five or six hours. The removal of the fat has been found to remove the difficulty encountered in the subsequent filtration, as it is the fat which usually stops up the pores of the filter.

[It would, therefore, appear that a previous treatment with ether is advisable in the case of all crude natural proteids which are used in digestive experiments. Even the white of egg contains small quantities of olein and palmitin and other fatty matter.—Ed. Am. Drugg.]

*Preparation of Pepsin Solution.*—The fresh mucous membrane of the stomachs of hogs is cut into small pieces, the mass put into a wide-mouthed bottle, and a quantity of water and hydrochloric acid added corresponding, for every stomach, to 5 quarts of the former and 10 Gm. of absolute hydrochloric acid. To preserve the liquid, 2.5 Gm. of salicylic acid are also added for every stomach. The mixture is allowed to macerate one or two days, under occasional agitation. It is then poured through a flannel bag, without pressure, and then filtered, first through a coarse, and then through a finer filtering paper. The liquid thus prepared will keep unchanged for months.

*Preparation of Pancreatin Solution.*—A sufficient quantity of pancreas from beeves is freed from fat as much as possible, finely chopped, triturated with sand, and then left exposed to the air for twenty-four to thirty-six hours. The mass is then triturated, in a mortar, with lime water and glycerin, a little chloroform is added (for keeping), and the mixture set aside for four to six days. The insoluble portion is now separated by expressing, the liquid portion passed through a coarse filter, the filtrate heated during two hours at a temperature of 37° to 40° C. (98° to 104° F.), and, if necessary, filtered again. For every kilo of fat-free pancreas there should be used 3 liters of lime water and 1 liter of glycerin (spec. grav. 1.230). The liquid thus prepared keeps unchanged for a long time, if enough chloroform is added to the final filtrate to have a few drops of it remain undissolved at the bottom of the vessel. Heretofore complaint has been made that the pancreatic extract filtered so slowly. This drawback is removed by the new proportions between lime water and glycerin, and by warming before the second filtration.

Prof. Stutzer's experiments on the digestibility of fodder were conducted as follows:

The sample (2 Gm.), previously deprived of fat as stated above, is covered with 250 C.c. of the pepsin solution, and warmed at 98° to 104° F. during twenty-four hours. During the first hours, at intervals of one hour, portions of 2.5 C.c. of a 10-per-cent hydrochloric acid are added until the whole liquid contains 1 per cent of HCl. The digestion is conducted in beakers standing in simple water-baths. Filtration is usually accomplished through asbestos by placing into the neck of a funnel, first, a cone made of brass wire, and then covering this with coarse-fibred and lastly with fine asbestos. In the case of pectous substances, it is preferable to use acid-washed filter paper, 12.5 Cm. in diameter, since pectin bodies soon stop up an asbestos filter.

*Preparation of the Alkaline Pancreatic Liquid.*—Mix 250 C.c. of the pancreatin solution, prepared as above directed, with 750 C.c. of a solution containing 5 Gm. of sodium carbonate (reckoned as anhydrous). Warm this mixture on a water-bath during one or two hours, at a temperature of 98° to 104° F., and remove any flakes which may from time to time separate, by filtration. It will thus become entirely clear, and is then ready for use. If it is to be kept over twenty-four hours without change, it is necessary to add to it some more chloroform (enough to saturate it).

The experiment of digestion is conducted as follows:

One hundred C.c. of the dilute alkaline pancreatic liquid last mentioned are put into a small "spritz" flask, and by means of it the residue of the sample which had already been treated with pepsin, as described above, and is still on the paper or asbestos filter, is, while still moist, washed into a beaker. If the filter was asbestos, this may be washed into the beaker at the same time. Themixture is warmed during six hours between 98° and 104° F., being occasionally stirred. It is then filtered through acid-washed paper (Schleicher & Schuell, No. 589; 12.5 Cm. in diameter). The insoluble matter remaining is washed with water, the filter and contents dried, and the nitrogen which remains in the insoluble portion determined by Kjeldahl's method. From the amount found, the nitrogen derived from the filter—which usually amounts to 0.050 to 0.100 Gm.—is deducted.—*Zeitsch. f. angew. Chem.*, 1890, 60.

### Jalap and Jalap Resin.

From a paper on this subject by Prof. F. A. Flückiger, published in the *Journ. de Pharm. d'Als.-Lorr.*, and translated in the *Pharm. Journ.* (January 11th), we select the following:

The resin of jalap is a much-used remedy, not yet supplanted by synthesis, which medicine, apparently, would not willingly be deprived of. But for nearly twenty years the fact has been becoming more and more evident that the tubers of *Ipomœa purga*, the only material used in Europe and America in the preparation of Resina jalapæ, yield less of that substance than in former times. In 1842 Guibourt, experienced and careful in such matters, found no less than 17.65 per cent of resin, and statements varying between this amount and 10 per cent were about that time not infrequent, if I read correctly. The authors of "Pharmacographia" have brought together (page 445) a few statements on the subject from the circle of their friends and acquaintances; the older drug houses would probably be in a position to contribute towards making them more complete. But probably for the last twenty years, as it appears to me, the statements of 10 per cent yields, or upwards, have been fewer, and the larger proportion of the jalap has yielded less, frequently only a small percentage of resin.

Whence this phenomenon? The complaint that the drug appeared inferior or consisted of smaller tubers has by no means been heard during the same time; indeed, to my knowledge, it has not been proved that the larger and older pieces are richer in resin. Reasons for an actual retrogression in the resin formation in the root organism of the jalap plant are not conceivable, so that one is brought to the presumption that a fraudulent abstraction from the jalap takes place. Of this Dr. Squibb, in the latest number of the *Ephemeris* (July, 1889), presents an indication the importance of which should not be underestimated. He made applications in Hamburg, London, and New York to be supplied with the finest jalap in considerable parcels, but obtained only one consignment that yielded more than 7½ per cent of resin. One house in New York, not more exactly specified by him, sent a representative to the district in Mexico that formerly yielded jalap, and authorized him to purchase the root at any price on the spot. Two hundred pounds obtained in this way yielded 16.9 per cent of resin. A further quantity of some hundreds of pounds, from the neighborhood of Xalapa and Perote, was on its way.

It may, therefore, be probably assumed that the dealer in Mexico has acquired sufficient chemical knowledge to wash the jalap with alcohol. If it were previously charred by suitable drying at a fire, it would not undergo any remarkable change through a short immersion in alcohol; and it may easily be demonstrated that if the root is previously bruised this is never the case.

### Artificial Musk.

The *Journal de Pharmacie d'Alsace-Lorraine*, in its last issue, says: Artificial musk is a chemical product, appearing in crystals of a yellowish white color and of a strong musk odor. For perfumery purposes the crystals should be dissolved in alcohol, with the addition of a trace of ammonia or carbonate of ammonia. This solution, which may be compared to tincture of musk, surpasses the latter in the intensity and penetrating power of its odor. The product to be used in perfumery must previously be diluted in a homœopathic manner. The following are the rather loose details of the manufacture of the article which have been deposited with the German Patent Office: "Boil in a reflux condenser toluol or toluene, $C_7H_8$, with one of the following halogen compounds of butyl, viz., chloride, bromide, or iodide of butyl, along with chloride or bromide of aluminium. The resulting product falls back into the water in the still, where it is decomposed and is distilled in a current of water vapor. The parts which distil between 170° and 200° are collected separately and treated with a mixture of nitric and fuming sulphuric acid. The product obtained from this process is washed and redistilled in alcohol, from which the artificial musk crystallizes out." The patent rights for France and abroad have been disposed of to a syndicate of manufacturing perfumers. There is no doubt that the trade in natural musk, so far as the perfumery branch is concerned, is threatened with a very serious crisis. The use of musk in medicine is very restricted, the article being now only employed in certain cases of typhus.—*Chem. and Drugg.*

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**Phosphorus in Diabetes.**—Dr. Balmanno Squire was recently consulted in regard to a skin affection from which an old gentleman of sixty suffered. Phosphorus perles was the internal remedy prescribed, and under this treatment diabetic symptoms, which the patient had manifested, gradually abated, and the patient greatly improved in health. Dr. Squire therefore recommends a trial of phosphorus in diabetes; dose beginning with one-thirtieth of a grain, and increasing to double that amount.—*Chem. and Drugg.*

### Adulteration and Sophistication of New Drugs.

In a paper upon the above topic in the *Druggists' Bulletin* for November, Mr. Geo. S. Davis mentions that, owing to the limited information in regard to new drugs as compared with those which have been longer in the market, their adulteration and sophistication is not attended with much risk of detection. He mentions, among other articles, the following as having come to his attention:

*Frankenia grandifolia* (Yerba Reuma) was, upon its first introduction, substituted with *Distichlis maritima*, a totally different plant, whose only claim to similarity was that it grew in the same localities and had the same appearance.

*Turnera microphylla* var. *Damiana*.—The leaves of *Bigelovia veneta*, a Mexican plant, are occasionally mixed with it. Both leaves are small, not exceeding an inch in length, and otherwise quite similar, although belonging to different natural orders.

*Rhamnus Purshiana* (Cascara Sagrada).—*R. Frangula* (common buckthorn), *R. Californica*, and other species of the same natural order, are very frequently substituted for or mixed with it.

*Berberis Aquifolium*.—*B. repens* is frequently found in the market under this name, although it contains much less berberin than the genuine.

*Strophanthus* seeds are very frequently adulterated with the seeds of *Holarrhena antidysenterica*, an East Indian plant, which fact, of course, proves the adulteration to be anything but accidental, strophanthus growing only in Africa.

*Strychnos Malaccensis* (Hoang-Nan).—This bark is occasionally found entirely replaced by the bark of the false angostura, or nux vomica tree (*Strychnos Nux-vomica*).

*Pilocarpus pennatifolius*.—Some alleged substitution of this drug on its first introduction was claimed to arise from the fact that the vernacular name, jaborandi, was assigned in South America to almost any plant having diaphoretic properties, some districts holding one particular plant in greater estimation than the jaborandi of other localities, even when the latter were found native in the habitat of the former. The leaves of *Serronia Jaborandi* are still placed in small lots on the market as the genuine jaborandi.

*Grindelia squarrosa*.—*Grindelia robusta* has been offered at various times as the genuine.

*Pichi* wood is very often employed instead of pichi tops, although the former contains but an infinitesimal proportion of the principles upon which the drug depends for its activity.

*Jamaica Dogwood*.—The bark of old trees is very frequently offered instead of the bark of the root.

*Viburnum prunifolium*, as found upon the market, instead of being collected from the root of the plant, as should be the case, often proves to have been cut from the trunk.

### The Star Anise Industry in Tonquin.

Dr. R. Blondel, through the medium of certain Tonquinese merchants who visited the Paris Exhibition, and with the assistance of the French Colonial Department, has brought to light a number of interesting new facts concerning the cultivation of the star anise tree in Tonquin, which he communicates to *Répert. de Pharmac.* The actual area in which the true star anise (*Illicium anisatum*) grows is very much smaller than that over which it was generally believed to be distributed. The trees, in fact, grow in *one province of Tonquin only*, viz., that of Lang-Son, which is about the size of two average French departments. Outside the province of Lang-Son, Mr. Blondel states, not a single tree is found. The geographical limits of the province of Lang-Son are the Maö-Son mountains and the Vau-Quan territory in the west, the Tan-Moy country in the south, and the Chinese frontiers in the north. A small part of the star anise country, in fact, overlaps the Chinese boundary, but the quantity of fruit gathered on Chinese territory is very small indeed, and does not yield over 10,000 to 12,000 pounds of essential oil, which was formerly sold by the Chinese dealers to the Hong-Kong merchants. But in the 1889 season nearly the whole of this oil has gone across the French-Indian frontier to swell the distillate of the Tonquin district, and was carried along with the latter to the market of Haï-Phong. In former seasons the directly opposite tendency prevailed, and the Lang-Son essential oil collected by the Chinese merchants was taken by them, along with their own, through southeastern China to Macao and Hong-Kong, whence English and German houses shipped it to London and Hamburg, these two markets being the central points of the trade. The exertions of the French-Indian Government have secured the future of this trade to French subjects, and the essential oil follows the Tonquin trade route. A competent judge states that *not one pound of oil reaches Macao*.

There are no regular star anise plantations in Tonquin. The trees grow up spontaneously, in patches of varying size, sometimes covering only 25 square feet surface and sometimes extending over 800 square feet. On the slopes of this hilly country the trees form small boscages, the greater part being situated on the slopes facing the sea. No special care is needed for the propagation of the trees. The attempts to cultivate the tree from seed in Hanoï and on the Bavi Mountain have always failed, in spite of all the precautions taken. The natives have also failed to propagate it from cuttings, although they are remarkably clever agriculturists. The star anise plots are the common property of the village. The crop is gathered and the distilling conducted at the public cost, and the profits afterwards divided. The tree does not yield any serviceable seed until its twelfth year, when it has grown to a height of about 14 feet. It then yields without interruption until its thirtieth to its thirty-fifth year. The trees are never cut down, even when dead: their hard and close-grained wood is regarded sacred by the natives, who will not use it at any price. During the French campaign in Tonquin serious disputes arose when the French engineers attempted to cut down these trees for building bridges.

*The Distilling*.—Every village possesses its own brick-built ovens in which the distilling process is conducted; some villages have as many as fifty of these ovens, which are large structures of brickwork, from 6 to 7 feet in height, and about 4 feet in diameter at the base. They have a closed and slightly vaulted roof. Part of the brickwork at the base of the back wall is removable, and through it the large copper distilling dish is introduced into the oven. A groove in the brickwork holds the edge of the dish and keeps it in its place. The removable piece is then replaced, thus entirely closing the oven. The seeds are put in the dish with a small quantity of water, and underneath a large wood fire is lighted, which receives air through a small hole at the front part of the brickwork. The essential oil [is vaporized, collects at the vaulted dome] trickles down into a groove about 2 feet below the top, and is conducted through a tin or bamboo tube, whence it passes into the collecting vessel. The distilling dish holds about 8 cwt. of fruit, which yields on the average 22 pounds of essential oil.

The vessels containing the oil are brought to the town of Lang-Son, the total quantity there being from 600 to 700 cwt. per annum. At Lang Son the oil is transferred from the native earthenware pots into tins, which are carried on the backs of natives to Phu-lang-Thuong, on the Song-Koi, or Red River, and from there the French steamers take the bulk of the oil to Haï-Phong for shipment, a small quantity also reaching the port by road.

Besides the true star anise trees of Lang-Son there is not another tree, true or false, to be found in the whole of Tonquin. In Annam, in the district of Quin-Hon on the coast, grows another species of *Illicium*, with smaller fruit, and more arched and smoother capsules, which is regarded as poisonous, and is never gathered for distilling purposes.

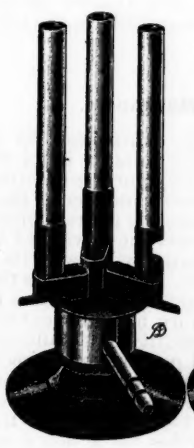


Fig. 1.

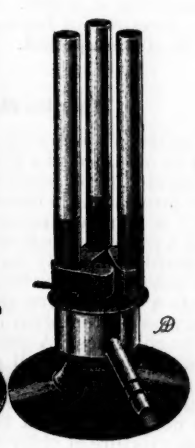


Fig. 2.

### A TRIPLE BUNSEN BURNER.

A modification of a Bunsen gas burner, designed by Mr. F. W. Branson, of Leeds, England, combines in one piece of apparatus several gas burners, and is simple in construction and not liable to derangement. Either one, two, or three Bunsen or luminous flames may be used, and the air or gas supply of either jet can be regulated independently or entirely cut off.

The air regulators are arranged in the usual way. The gas supply is controlled by altering the position of the jets. If arranged as in Fig. 1 or 2, the gas supply is at full. If, however, either jet be rotated in the opposite direction, the gas is gradually reduced and finally cut off. Fig. 2 shows the three jets arranged for a single large flame, but if the jets are separated, as in Fig. 1, a much larger area can be heated by means of the three distinct flames which then result.—*Journ. Soc. Chem. Ind.*, 1889, 957.

### The Cultivation of the "Insect Powder Plant."

MR. P. MACOVAN, F.L.S., of the Cape Town Botanic Garden, makes some remarks on the plants yielding Persian insect powder (*Gard. Chron.*, January 11th, page 44), which seem to indicate that attention is being drawn to the cultivation of these plants in the colony. The flowers are at times so scarce and the powder frequently so adulterated that it may be hoped the market may be supplied in the future from so promising a district. Mr. MacOvan describes the plant called *Pycnanthemum Willemotii*, Duch.—named after Mr. C. Willemot, who commenced in 1856 the cultivation of the "Caucasian" plants in France—as being identical with *P. cinerariæfolium*. Neither under the one name nor the other, however, is the plant mentioned in Boissier's "Flora Orientalis" as a native of the Caucasus, although both *P. roseum* and *P. carneum* are therein enumerated. Mr. MacOvan points out that *P. cinerariæfolium* likes an open, dry soil, not too clayey, as both the seed and the plant are easily killed by excessive moisture. The seed is sown about half an inch below the surface, and germinates in about thirty days. As soon as the plants can be handled they are placed six inches apart, and in three months' time are placed one foot apart. The flowers are produced in the second year. In this country the plant appears to stand the winter in sandy loam in the south of England, but has not been observed to flower freely. There is, however, some difficulty in obtaining good seed, for the seed sent from Dalmatia has at times been found to have been carefully baked to prevent its germination.—*Pharm. Journ.*

### Copper Salts as Remedies for Potato Blight.

IN regions where certain forms of disease blight growing potatoes, apothecaries may add to their business the sale of the following mixtures:

1. Pulverized sulphate of copper, 6 pounds, to be dissolved in 4 gallons of hot water; fresh lime, 4 pounds, to be diffused in 4 gallons of cold water. These two solutions are to be mixed and enough cold water added to make 22 gallons.

2. Carbonate of copper, 3 ounces; ammonia, 1 quart; mix. After the solution of the copper salt add enough cold water to make 22 gallons.

The former of these is known as the "Bordeaux Mixture."

When the plants are about a foot high, and before the blossoms appear, they are to be sprayed with one or the other of these solutions, and this is to be repeated at least as often as every two or three weeks, and oftener when the occurrence of rain washes the deposit of copper salt from the plants. The latter mixture is said to be equally effective as the former, and has the advantage, from the apothecaries' point of view, of being in a form which can be prepared in advance and bottled for sale, requiring only the addition of water. For further details, see the *Scientific American* of January 25th, or the *Garden and Forest* of about that period.

### Metallic Manganese.

A NEW mode of preparing manganese, by which the metal can be obtained in a few minutes in tolerably large quantities and almost perfectly pure, is described by Dr. Glatzel, of Breslau, in a current number of the *Berichte*. A quantity of manganous chloride is first dehydrated by ignition in a porcelain dish, and the pulverized anhydrous salt afterward intimately mixed with twice its weight of well-dried potassium chloride. The mixture is then closely packed into a Hessian crucible and fused in a furnace at the lowest possible temperature, not sufficient to volatilize either of the chlorides. A quantity of metallic magnesium is then introduced in small portions at a time, the total quantity necessary being about one-sixth of the weight of the manganous chloride employed. Provided the crucible has not been heated too much above the melting point of the mixture of chlorides, the action is regular, the magnesium dissolving with merely a slight hissing. If, however, the mixture has been heated till vapors have begun to make their appearance, the reaction is extremely violent. It is therefore best to allow the contents, after fusion, to cool down to a low red heat, when the introduction of the magnesium is perfectly safe. When all action has ceased, the contents of the crucible are again heated strongly, and afterward allowed to cool until the furnace has become quite cold. On breaking the crucible, all the potassium chloride and the excess of manganous chloride is found to have been volatilized, leaving a regulus of metallic manganese, fused together into a solid block, about 3 parts by weight being obtained for every 2 parts of magnesium added. The metal, as thus obtained, is readily broken up, by hammering, into fragments of a whitish-gray color, possessing a bright metallic lustre. The lustre may be preserved for months in stoppered glass vessels, but when exposed to air the fresh surface becomes rapidly brown. The metal is so hard that the best files are incapable of making any impression upon it. It is so feebly magnetic that a powerful horseshoe magnet capable of readily lifting a kilogramme of iron has no appreciable effect upon the smallest fragment. It was noticed that the introduction of a small quantity of silica rendered the manganese still more brittle, and caused it to present a conchoidal fracture, that of pure manganese being uneven. The specific gravity of the metal, former determinations of which have been very varied, was found to be 7.3921 at 22° C. This number, which was obtained with a very pure preparation, is about the mean of the previous determinations. Dilute mineral acids readily dissolve the pulverized metal, leaving a mere trace of insoluble impurity. It is also satisfactory that practically no magnesium is retained alloyed with the manganese, and the introduction of carbon is altogether avoided by the use of this convenient method.—*Nature.*

### Antiaris Toxicaria and its Constituents.

THE milky juice of *Antiaris toxicaria*, used as arrow poison in the East Indian Archipelago, contains, according to H. W. Bettink, at least three active principles, which seem to be closely allied to each other (*Ned. Tijdschr. v. Pharm.*) The most important of these, antiarine ($C_{14}H_{20}O_{10}$), is precipitated from its solutions by tannin, but only in a state of insoluble combination with other substances. When the dried juice has been treated with petroleum ether or benzol, the resin, the fat, and the india-rubber-like portion removed, and the residue extracted by alcohol, a thick fluid remains, from which the antiarine separates in the form of crystals. These represent about 1.7 per cent of the dry, or 0.6 per cent of the fresh juice. According to Tichmann, they belong to the rhombic system. By addition of sulphuric acid they are colored light brown and decompose. Dogs and rabbits are killed in a few moments by a dose of one-half Mgm. injected into the blood. The second constituent is obtained from the same syrupy mass or mother-liquid by drying it on a water-bath, letting it stand for twenty-three hours, and then stirring it up with small quantities of water, during which process more of the antiarine crystals will be separated. After they have ceased to form, a substance may be thrown down by diluting the mother-liquid with water and adding a solution of tannin. This substance, for which the name oubaine has been proposed, very closely resembles antiarine in its physiological effects, and gives the same reactions with acids, but differs in being very soluble in water and in its behavior towards tannin. The third constituent of the juice—also non-crystallizable, easily soluble in water and alcohol, but not precipitated by tannin—is called toxicarine. The author promises further communications upon the subject.

### Determination of the Specific Gravity of Viscid Liquids.

IT happens not seldom that the chemist has to determine the specific gravity of a liquid which is very viscid and obstinately retains air bubbles. The presence of the latter renders it impossible to make an accurate determination. The usual method heretofore pursued to get rid of the air has been to warm the liquid until all bubbles have escaped, but this was usually accompanied by loss of water. [A subsequent addition of water, to make up the former weight, is of little value, since this newly added water would have to be homogeneously mixed with the viscid liquid, and this very operation would be apt to introduce air bubbles again.—ED. AM. DR.]

Dr. Ad. Genieser now proposes the following manipulation to overcome this difficulty:

The viscid liquid is first gently warmed (care being taken that no notable loss of water may occur) so as to render it more thin fluid, then passed through a wire sieve (to remove impurities, if necessary—for instance, in the case of molasses), and enough of the strained liquid poured into a specific-gravity bottle to fill it about two-thirds full. Supposing the pycnometer had weighed, empty, 24.6506 Gm., and with the syrup or other viscid liquid 79.4420 Gm. It would, therefore, contain 54.7914 Gm. of the syrup, etc. Next the pycnometer is cautiously heated in an oil-bath, or preferably in a salt solution of such density that its boiling point is somewhat above that of the syrup, until the latter actually boils. By keeping it at this temperature a few minutes all air bubbles will be driven to the surface and there form a thin scum. The bottle is now cooled to 17.5° C. (ab. 64° F.), and then a little distilled water added, which will speedily form a clear layer between the air-free syrup and the scum, and the latter will rapidly be dissipated, as it consists of air bubbles. The pycnometer is then completely filled with distilled water and weighed. Supposing it should weigh 89.766 Gm., it follows that, not counting the evaporated water, there were added 89.766 − 79.442 = 10.324 Gm. of water. Supposing, further, that the pycnometer is known to hold exactly 50 Gm. of water at 17.5° C. (64° F.), it follows that the syrup within the pycnometer occupied the same space as 50 − 10.324 = 39.676 Gm. of water. Hence its specific gravity is 54.7914 : 39.676 or 1.38097.—*Zeitsch. f. angew. Chem.*, 1890, 44.

### Sodium Cresotinate or Cresotate.

As far back as 1876 sodium cresotate (or cresotinate *) was recommended as an antipyretic, but it appears to have fallen into discredit on account of uncertainty of action. As the compound used was probably a varying mixture of the sodium salts of the three isomeric acids derived from the corresponding cresol isomers, Prof. Domme instituted some comparative therapeutic experiments with the separated compounds (*Pharm. Zeit.*, January 29th, page 68). He reports that only the paracresotic acid is of use in medicine, the ortho- and meta-compounds proving, one inactive, and the other dangerous. Prof. Loesch found that sodium paracresotate is well tolerated by adults in quantities reaching to 6 or 8 Gm. daily. A part of the compound appears to pass unaltered into the urine, which then gives a violet color with ferric chloride. Administered to children it behaved as an active antipyretic in large doses, 1 Gm. having been given to a child twelve years old within three hours. It is further stated that good results have been obtained with the salt in the treatment of acute gastro-intestinal catarrh in children. Sodium paracresotate is said to occur as a fine crystalline powder, with a distinctly bitter but not disagreeable taste. It dissolves in 24 parts of warm water, from which it does not separate on cooling. The free acid crystallizes from aqueous solutions in long, shining needles; it melts at 151° C., and sublimes undecomposed.—After *Pharm. Journ.*

### Improvements in the Manufacture of Glycerin and Fatty Acids.

WHILE formerly the decomposition of fats, for the production of fatty acids (in the stearin industry) and of glycerin, was accomplished by first converting the fats into a calcium soap, this method has for many years given place, in most large works, to the process of "aqueous saponification," as it is sometimes called, that is, to a process in which the fat is decomposed, by the action of superheated steam, into fatty acid and glycerin without the intermediate production of a real soap.

This last-named method has gradually been brought to a high state of perfection. At the well-known stearin works of De Milly, in Plaine St. Denis, the operation is conducted as follows:

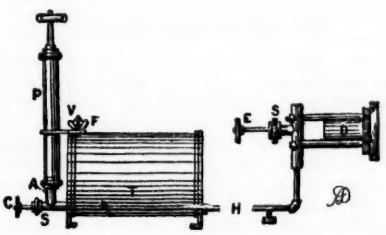
The fats, contained in closed boilers provided with stirrers, and mixed with a certain proportion of water, are treated with a current of superheated steam at a pressure of 15 atmospheres (225 lbs. to the square inch)—that is, at a temperature of 200° C. (392° F.)—being constantly kept in motion by the stirrer. The excess of steam passes out from the boiler, and finds its way, condensed to water (but still very hot), to spiral tubes contained in a tank filled with aqueous glycerin such as had been obtained in previous operations. By this method the heat remaining in the water of condensation is completely utilized, and the glycerin concentrated. At the same time the condensation of the steam in these spiral tubes constantly attracts a fresh supply of live steam from the steam-boiler. Between the latter and the fat-boiler a pressure regulator is interposed, and, as the steam-boiler is automatically fed to a constant level, the pressure in the fat-boiler is constantly maintained at 15 atmospheres.

After the separation of fatty acids and glycerin is completed, they are simply separated, the dilute glycerin passed on to the evaporating tanks, and the fatty acids are subjected to distillation. This is now conducted in a much more rapid manner than formerly by injecting into the receiver a jet of cold water under very high pressure, which acts as an aspirator for the vapors of the fatty acids, and at the same time instantly condenses the latter. A single retort can thus yield from seven to eight tons of perfectly white, distilled fatty acids in twenty-four hours. These are then passed on to the presses, where the different acids are separated, the stearic acid (in common parlance often called stearin, though this is chemically a compound of stearic acid and glyceryl) being, of course, the most important.—After *Zeitsch. f. ang. Chem.*, 1890, 39.

### Determination of Caustic Soda and of its Carbonate in one Operation.

HUGO GOEBEL recommends the use of two indicators, namely, phenolphthalein and "Poirier's Blue, C. L. B.," for this purpose.

In the first place, by a preliminary trial it is ascertained how much of volumetric acid is necessary to completely neutralize a weighed quantity of the alkali. For the test itself, an amount of acid a little short of this is put into a flask together with one drop of phenolphthalein (1 part dissolved in 90 parts of 90 p. c. alcohol). The liquid in the flask should not measure more than 50 C.c. The alkali is now added to the flask and its complete decomposition accomplished by adding the necessary quantity of volumetric acid from a burette. When the solution has just turned colorless, the amount of acid used corresponds to the quantity of caustic alkali plus one-half of the carbonate present. Next one drop of a solution of the Poirier's Blue (1 in 400 parts of water) is added, and the titration continued until a dark-blue tint appears. The acid consumed in the last operation corresponds to *half* of the carbonate present. By deducting the latter from the former, the amount of caustic alkali is found; and, by multiplying with 2, the amount of carbonate.—After *Chem. Zeit.*




### A HYDROCARBON FURNACE.

FROM a paper showing the utility of a hydrocarbon furnace in assaying (and also in various other chemical operations), communicated by Mr. G. E. R. Ellis to the *Journal of Soc. of Chem. Ind.* (December 31st), we take the following:

I have ventured in this paper to give particulars of a piece of apparatus which my own experience, confirmed by that of many other assayers, has shown to be eminently serviceable as a readily controllable source of intense heat, such as is required by analysts, assayers, metallurgists, and others. This furnace has been before the American public for several years, and is therefore past the experimental stage, but, so far as I am aware, it is comparatively or wholly unknown to the English scientist.

Assayers know full well that there are many inconveniences and annoyances necessarily connected with the use of furnaces burning coal or coke; this apparatus, on the contrary, does away with the constant replenishing of fuel, with all dust and ashes, and with a large amount of radiated heat; indeed, it may be said that it possesses all the advantages of a gas furnace with the additional advantage that it may be forced to practically any extent without the use of a blower or foot bellows. Once pumped up—which operation occupies only a few seconds—the blast will continue for a long time without further attention.

The apparatus consists of three parts (each of which may be procured separately), viz., the tank and blowpipe, the muffle furnace, and the crucible furnace. The tank and blowpipe are represented in Fig 1. P is an ordinary force pump, at the bottom of which, at A, is a valve which closes automatically upon releasing the pressure from the pump; C is a check valve which closes the inlet to the tank T completely; F is a filling screw for introducing the fuel used, viz., gasoline; V is a vent screw for letting off the pressure when the operation or experiment is finished; H is a pipe leading from the tank to the burner D; E is the burner regulator, terminating in a fine point, closing the orifice of the burner; S S are packing boxes. Upon opening C and pumping a few strokes, a pressure is created in the tank and *on top* of the fluid, forcing it through the tubes of the burner, which, being previously heated, vaporize the gasoline. This issues from the orifice at the end of E as a highly heated gas, and burns as such in the form of a powerful blast. After being once started the heat of the flame, passing through the burner D, vaporizes the fluid in the tubes, and hence the apparatus is automatic.

The air which is forced in is not consumed, so that to keep up the blast it only requires a few strokes of the pump occasionally (every half-hour or so) to maintain the pressure lessened by the consumption of the gasoline.

The way to start the blowpipe is simple, and as follows: Close E, unscrew F, and introduce gasoline according to the capacity of the tank. Replace F, close V, open C one or two turns, and give three or four full strokes of the pump P, then close C. Heat the burner by burning some of the gasoline in a suitable vessel (an old scarifier will do well) placed under the burner; when hot apply a match and open E gradually until the action is more or less uniform. The burner is hot enough when no *liquid* or *spray* issues from the orifice; if not hot enough, let the oil burn slowly until no liquid or spray issues. When sufficiently heated, the blast can be made of any desired intensity by the use of the force pump, as above. The mouth of the burner D should be 2 to 3 inches from the inlet of either furnace, otherwise the combustion in the interior of the furnace will not be complete. To stop the action of the blowpipe, simply shut the regulator E or open screw V, or do both. When not in use, keep V open.

For very high temperatures or muffle work we proceed as follows:

1. Light as above and heat inside of furnace to bright redness.
2. Place the burner *against* the inlet of the furnace.
3. Turn out burner flame with E, and immediately

* We prefer the term "cresotic acid" to that of "cresotinic," in accordance with Fownes, Watts, and other authorities.—ED. AM. DRUGG.

turn it on again without lighting it (or simply blow the flame out), when, if the furnace is hot enough, the gas will light *inside* the furnace. When burning inside the furnace, there must be no flame in the burner tube. The heat can be regulated by the use of E and P.

The tanks are made in two sizes; one contains half a gallon of oil, the other one gallon, and cost (with blowpipe complete) at Chicago, respectively, $23.00.

### Delicate Copper Reagent.

THE yellow coloration of a sample of distilled water answering to the ordinary tests when potassium iodide was dissolved in it, was found, by means of potassium ferrocyanide, to be due to minute trace of a cupric salt, the reaction apparently consisting in reduction of the cupric salt and formation of cuprous iodide (*Pharm. Centralh.*, January 16th, page 32). This reaction proved to be extremely delicate. A 1 in 10,000 aqueous solution of cupric sulphate gave with ammonia a scarcely perceptible blue tinge; treated with an equal quantity of 1 in 20 potassium ferrocyanide solution, after dilute acetic acid had been added, it gave a distinct brown color; whilst with an equal quantity of 1 in 10 solution of potassium iodide it gave a distinct yellow color. At 1 in 200,000 the reaction of potassium ferrocyanide was no longer perceptible, but potassium iodide produced a faint yellow that was changed to violet on the addition of a few drops of starch mucilage. At 1 in 500,000 the yellow color could no longer be seen, but there was still a distinct violet coloration when starch was added. The original contamination is attributed to the dropping of some particles of fat into the boiler, the volatile fatty acid from which is supposed to have passed over with the steam and attacked the copper condenser.—*Pharm. Journ.*

### Specific Gravity of Methylic Alcohol.

FROM a new table of specific gravities of wood alcohol determined and calculated by W. Dittmar and Charles A. Fawsitt (Transact. Roy. Soc. Edinb., 33, ii., 509; *Zeit. f. anal. Chem.*, 1890, 82), we select those figures which are most generally needed for practical purposes.

The specific gravities are given on the basis of water at 4° C.

| Per cent $CH_4O$. | Specific gravity at 60° F. | Per cent $CH_4O$. | Specific gravity at 60°F. |
|---|---|---|---|
| 0 (pure water). | 0.99907 | 90 | 0.82396 |
| 10 | 0.98262 | 91 | 0.82123 |
| 20 | 0.96808 | 92 | 0.81849 |
| 25 | 0.96093 | 93 | 0.81572 |
| 30 | 0.95355 | 94 | 0.81293 |
| 40 | 0.93697 | 95 | 0.81013 |
| 50 | 0.91855 | 96 | 0.80731 |
| 60 | 0.89798 | 97 | 0.80448 |
| 70 | 0.87487 | 98 | 0.80164 |
| 75 | 0.86290 | 99 | 0.79876 |
| 80 | 0.85035 | 100 | 0.79589 |
| 85 | 0.83788 | | |

### Purification of Alcohol for Laboratory Uses.

PROF. E. WALLER makes the following communication to the American Chemical Society :

Comparatively recently several papers have appeared on the subject of the reactions of potassium permanganate with alcohols, and the impurities which they may contain.*

In preparing alcoholic solutions of caustic alkalies, and also of silver nitrate (for fat tests, etc.), I have been annoyed, as have other chemists, by the unsatisfactory character of the solutions obtained, in consequence of the presence of impurities in the alcohol bought for laboratory use. I find also that most alcohol of 93 per cent, when kept in tin cans, slowly reacts on the tin, giving, after a while, a cloud of $SnO_2$ which is too fine to filter out, and renders purification by distillation necessary. In the light of the results obtained by the writers above alluded to, I have adopted the following method for the purification of my alcohol, on which I ask the criticism of the members of the Society :

A convenient amount of the alcohol to be purified is shaken with pulverized potassium permanganate until it assumes a decided color. It is then allowed to stand for some hours until the permanganate has been decomposed and brown manganese oxide is deposited. A pinch of pulverized calcium carbonate is then added, and the alcohol distilled at the rate of about 50 C.c. in twenty minutes from a flask provided with a Wurz tube or one of the Lebel-Heninger pattern. The distillate is tested frequently until about 10 C.c. thereof, when boiled with 1 C.c. of strong (syrupy) solution of caustic soda or potash, give no perceptible yellow coloration on standing for twenty minutes or half an hour. What distils over after that time is preserved for use.

The first distillates may be added to the small amount remaining in the distilling flask (which should not be driven down to complete dryness), and a fresh portion of purified alcohol recovered.

The rationale of the proceeding appears to be that the permanganate oxidizes and destroys chiefly the fusel oil, furfurol, and other compounds of that nature, the acids resulting from the reaction are neutralized by the calcium carbonate added before distillation, and by distilling slowly the aldehyde, at least, is concentrated in the first portions of the distillate. Distillation of alcohol containing caustic potash or soda seemed to cause a constant formation of aldehyde. The alcohol thus purified is perfectly neutral, and gives most satisfactory results when used as a solvent for caustic alkalies or silver nitrate, the solutions remaining as colorless as distilled water, even after boiling and standing indefinitely, if properly protected from dust and other external influences.—*Journ. Am. Chem. Soc.*

* Habermann, Fres. Ztschr. anal. Chem., xxvii., 663 ; Roese, ib., xvii., 355; Cazeneuve, Bull Soc. Chim. (Paris) [3] i., 700. See also Dingl. Polyt. Jour., cclxxiii., 374.

### The Weight of Water.

SCIENCE is correcting itself in the department of weights and measures. It is now discovered that an imperial gallon of water, according to the capacity hitherto prescribed for it, does not weigh 70,000 grains, and consequently it is incorrect to say that "a pint of water weighs a pound and a quarter," unless we allow an increased volume for the pint. The correction to be made is not much; but still it is something.

In June, 1824, an act of Parliament was passed, coming into operation on January 1st, 1826, which was thought to settle this matter once for all.

In that statute it was declared that if the imperial pound, as represented by a brass weight in the custody of the clerk of the House of Commons, happened to be lost, defaced, or otherwise injured, it should be restored by comparison with a cubic inch of distilled water, weighed in air by brass weights, at the temperature of 62° F., the barometer being at 30 inches. Such cubic inch of water was stated to be equal to 252.458 grains, the standard troy pound being 5,760 such grains, and the avoirdupois pound 7,000 such grains troy.

The gallon was specified as the standard measure for capacity, and was to be equal in bulk to 10 pounds avoirdupois of distilled water, weighed in air in the manner already described.

The capacity of the imperial gallon thus became 277.274 cubic inches, representing 70,000 grains. In like manner a cubic foot of water was reckoned to weigh 62.321 pounds avoirdupois. The same standard in respect to the cubic inch, and consequently the cubic foot, was adopted in the Sale of Gas Act of 1859. But a report from the standards office of the Board of Trade has just been issued, by which it appears that experiments have been in progress in the department since the year 1878 with a view to ascertain "what is the true weight of a cubic inch of distilled water."

It is shown that the law passed in 1824, regulating the weights and measures, was in reality based on weighings made as far back as 1798. In 1870 there were distinct differences among scientific authorities as to the true weight of a given volume of water, and it was for this reason that it was deemed inadvisable to re-enact in the Weights and Measures Act of 1878 so much of the act of 1824 as fixed the weight of the cubic inch at 252.458 grains.

The experiments at the standards office have now at last landed us in the conclusion that water is not quite so heavy as the act of 1824 declared it to be, the cubic inch being only equal to 252.286 grains.

The excess is only about one-sixth of a grain in a cubic inch, but a "note" attached to the report specifies the old estimate as "erroneous for scientific purposes," and it is suggested that in any future legislation on this subject it may be desirable to consider whether the new value for the cubic inch might be substituted for the old and incorrect one.

It is of some interest to observe how far the new value affects the old reckoning. Water is a shade lighter than we thought it to be, so that we lose nearly 48 grains in a gallon, the 70,000 grains giving place to 69,952; or else we must give the gallon greater capacity.

In a cubic foot of water we lose 297 grains, or nearly three-quarters of an ounce. The pint, considered as the eighth part of 277.274 cubic inches, drops from 8,750 grains to 8,744, creating a loss of 6 grains, or, more correctly, 5.96.

The excess has not been much, and yet it is to be regretted that the matter was not set right at first. It seems curious that a problem so close to our hands should have remained so long unsettled.

When the measurement relates to the distance of the earth from the sun, we expect to find that the earlier calculations are susceptible of correction. But most of us thought that we had a firm foundation in the table of weights and measures.

It proves that the weight of a cubic inch of water was

overestimated. Consequently, the number of cubic inches corresponding to 10 pounds of water was underestimated, and the gallon was made proportionately too small, together with all the derived measures. Still, to do our scientists credit, we must remember that the error in this case is less than 1 part in 1,400. When Sir J. Herschel was defending the character of astronomical science, in view of an error of nearly 4,000,000 miles in estimating the sun's distance, the correction was shown to apply to an error of observation so small as to be equivalent to the apparent breadth of a human hair at a distance of 125 feet, or a sovereign 8 miles off. Moreover, the error had been detected by the astronomers themselves, and the needful correction applied. It happens that another correction has been made since that date, as recently as a year ago, showing that the error in regard to the sun's distance was not as great as the distinguished astronomer supposed.

So by degrees we get to the truth, and may be supposed now to know the real weight of distilled water. The correct observation of common things is not so easy as many people suppose, and difficulties unknown to the multitude beset the path of absolute accuracy. It needed the mechanical genius of Sir Joseph Whitworth to produce so seemingly simple a thing as a perfect plane, which everybody thought was actually accomplished before.

The table of our weights and measures has now to be amended to this extent, that a gallon of water weighing 10 pounds requires a capacity of 277.463 cubic inches instead of 277.274,* the enlargement being rather less than one-fifth of a cubic inch. The capacity of the pint becomes 34.683 inches instead of 34.659. The difference in the cubic foot we have already noticed.—*The Engineer.*

Dicotoin ($C_{44}H_{34}O_{11}$); Cascarin; Hedyosmin; Asepsin; the bitter of *Brownea grandiceps;* the derivative of *Iboga vateriensis;* Guiana-bark tannin; the alkaloid of Scopola-rhizome, Mandragorin, Lobeline, Bitartrate of Nicotine ($C_{18}H_{26}N_2O_{12}$), Bitter Almond Oil and Amygdalin from seeds of *Lucuma mammosa*, ethereal oil from *Cinnam. citriodor.*, and Luridinic acid. Many of the above mentioned principles have, so far, not been described at all, or, if mentioned, only treated superficially, in the available literature. Hence, in some cases, it is doubtful whether they are alkaloids or neutral principles.

### The Determination of the Diastasic Power of Extract of Malt.

CONSIDERABLE importance is attached to the estimation of the digestive power of extract of malt upon starch; it is therefore very strange that published results should show such extraordinary differences; *e.g.*, Messrs. Dunstan and Dimmock (who were, I believe, the first to introduce a ready method for making this determination) state that the best malt extracts of the market should completely digest *one-seventeenth* of their weight of starch in several (three ?) hours (*Pharm. Journ.* [3], ix., page 733; AM. DRUGG., 1884, 97, 203). Carl Jungk, in a paper in the *American Journal of Pharmacy*, June, 1883 (*Pharm. Journ.*, xiv., page 104; AM. DRUGG., 1884, 203), describes a method whereby the effect of malt extract upon starch mucilage is tested at intervals of one minute, and says that good extract of malt should convert *its own weight* of starch within ten minutes at 100°F. Later still (*Pharm. Journ.*, xv., page 236) T. S. Dymond compares the two methods above referred to, and, after condemning Jungk's method, states that a good malt extract should completely digest one-fifteenth of its weight of starch in half an hour at 140° F. [Another method of assaying extract of malt will be found in AM. DRUGG., 1886, 119.]

| | 0.05 GRAMME. | | | | 0.1 GRAMME. | | | 0.5 GRAMME. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5 minutes. | 15 minutes. | 30 minutes. | 45 minutes. | 5 minutes. | 15 minutes. | 30 minutes. | 5 minutes. | 10 minutes. | 15 minutes. | 30 minutes. |
| Arrowroot | Done | | | | Done | | | Bright brown. | Pale brown. | Done.* | |
| Maize | Bluish | Bluish | Done | | Indigo | Indigo blue. | Violet | | | | Clear blue.‡ |
| Potato | Done | | | | Done | | | Bright brown. | Pale brown. | Done.† | |
| Rice | Bluish | Pale blue. | Done | | Blue | Bluish | Pale violet-brown | | | | Clear violet.‡ |
| Wheat | Brownish-violet. | Violet-brown. | Violet tint. | Very pale violet. | Brown-violet. | Violet | Purple | | | | Clear violet.‡ |

* Completed in twelve minutes.
† Completed in twelve and one-half minutes.
‡ These colors (blue and violet) refer to the liquid five times diluted; the color was too deep to be seen before solution.

### Rare Plant Derivatives, etc.

AT the sixty-second meeting of the "Deutsche Naturforscher und Aerzte" Dr. Theodor Schuchardt, of Görlitz, exhibited a very notable collection of chemical preparations and drugs, a list of which has kindly been sent us by Messrs. Lehn & Fink, of New York. The list is too long, notwithstanding its interesting character, to reproduce here, and embraces 15 inorganic preparations, 14 of the fat series, 39 of the aromatic compounds, 62 plant derivatives, and 85 crude drugs. At our request Messrs. L. & F. have added to the list the prices, per ounce, for which the plant derivatives can be bought.

| | | | |
|---|---|---|---|
| Antiarine, $C_{14}H_{20}O_6+2HO$ | $15.00 | Hyænanchin | $15.00 |
| Arecaine, $C_7H_{11}NO_2+H_2O$ | 12.00 | Hydrocotoin, $C_{16}H_{14}O_4$ | 4.50 |
| Arecolin, $C_8H_{13}NO_2$ | 9.00 | Kawain | 4.50 |
| Aribine chlorhydrate, $C_{22}H_{20}N_{41}$, 2HCl | 18.00 | Leucotin, $C_{34}H_{32}O_{10}$ | 15.00 |
| Asaron | 1.00 | Leucodendrin | 1.50 |
| Acid, druminic | 7.00 | Lobeline sulphate | 5.00 |
| embelic, $C_9H_{14}O_2$ | 2.50 | Mandragorine sulphate $(C_{17}H_{23}NO_3)_2H_2SO_4$ | 9.00 |
| gymnemic, $C_{32}H_{55}O_{12}$ | 2.50 | Neriine | 12.00 |
| vulpic, $C_{19}H_{14}O_5$ | 7.50 | Oxyleucotin, $C_{34}H_{32}O_{12}$ | 50 |
| Chelidonine, $C_{19}H_{17}N_3O_3$ | 1.00 | Oleandrin | 6.00 |
| Chitine, $C_{17}H_{28}N_2O_{11}$ | 1.00 | Ouabaine, $C_{30}H_{46}O_{12}7H_2O$ | 10.00 |
| Cotoin, $C_{23}H_{18}O_6$ | 1.00 | Paracotoin, $C_{13}H_{18}O_6$ | 4.00 |
| Curarine, $C_{18}H_{28}N$ | 25.00 | Proteacin | 1.75 |
| Drumine | 9.00 | Santalin | 85 |
| Emodin, $C_{15}H_{10}O_5$ | 75 | Santoninoxim, $C_{15}H_{19}NO_3$ | 7.50 |
| Erythrophlœine | 6.00 | Strophanthidin | 2.00 |
| Fraxetin, $C_{10}H_8O_5$ | 4.00 | Strophanthin (hisp.) | 2.25 |
| Fraxine, $C_{16}H_{18}O_{10}$ | 3.25 | " (asper) | 4.00 |
| Harmaline, $C_{13}H_{14}N_2O$ | 65 | " (glaber) | 6.00 |
| Harmine, $C_{13}H_{12}N_2O$ | 75 | Strophanthinol | 75 |
| Herniarine, $C_{10}H_8O_3$ | 3.50 | Stylophorine hydrochl | 2.00 |
| Hurine | 15.00 | Sulamine | 7.50 |
| | | Tanghinine | 10.00 |
| | | Wrightine | 7.50 |

Besides the above-named substances the following were shown, but they are simply pharmaceutical curiosities and not to be found in the market:

* Regarding this figure see Oldberg's "Weights and Measures" (3d ed.), page 87, note. If the amended weight pointed out in the paper proves to be correct, then the United States gallon will contain 231.15746 cubic inches instead of 231.—ED. AM. DRUGG.

In the first place I will describe the method I am in the habit of using, for which I do not claim any originality, it being simply a modification of the foregoing processes:

1. Prepare a mucilage by mixing 1 Gm. of potato starch or arrowroot (dried in an oven at 212° F.) with 10 C.c. of cold water, add 100 C.c. of boiling water, and boil the whole for half an hour; allow to cool to about 100° F., and make up the measure to 100 C.c.

2. Dissolve 5 Gm. of the sample of extract of malt in water sufficient to produce 50 C.c. of solution.

3. Dissolve 0.1 Gm. iodine in 100 C.c. of water by the aid of 0.2 Gm. of iodide of potassium; 50 C.c. of starch solution are introduced into a flask or bottle, and kept in a water-bath at a temperature of 98° to 100° F. until it has attained that temperature, when 5 C.c. of the malt solution are added (also at 98° to 100° F.), gently shaken to mix thoroughly, and replaced in the water-bath; after five minutes and at intervals of five minutes (or less if desirable) 4 C.c. of the liquid are poured into a test tube containing 1 C.c. of the iodine solution. A good extract of malt will give no indication of starch or dextrin after ten, or at most fifteen, minutes, while one which still gives a distinct coloration after thirty minutes should be rejected as quite unfit for use; that is, *extract of malt should completely digest its own weight of potato starch in ten to fifteen minutes at 98° to 100° F.*

It will be remarked that I have selected potato starch or arrowroot for this test, other starches giving widely differing results. The accompanying table will indicate the importance of using one or other of these kinds of starch, and, as mentioned above, probably suggests an explanation of the widely differing results of other observers.

The different mucilages were all prepared as described above, and quantities of mucilage representing 0.05, 0.1, and 0.5 Gm. of each starch (dried) introduced into the bottles, the bulk of each being made up to 50 C.c. with distilled water, and 0.5 Gm. of extract of malt added to each. —R. A. CRIPPS in *Pharm. Journ.*, December 21st, 1889.

### Brown-Sequard's Mixture for Epilepsy.

| | |
|---|---|
| Sodium Bromide | 180 gr. |
| Potassium Bromide | 180 " |
| Ammonium Bromide | 180 " |
| Potassium Iodide | 90 " |
| Ammonium Iodide | 90 " |
| Ammonium Carbonate | 60 " |
| Tincture of Calumba | 1½ fl. oz. |
| Water enough to make | 8 " " |

Dose: 1½ drachms before meals and 3 drachms at bedtime.

### Pate Dentifrice.

| | |
|---|---|
| Precipitated Chalk | 150 parts. |
| Powdered White Soap | 150 " |
| Powdered Orris Root | 50 " |
| Carmine | 2 " |
| Oil of Peppermint | 15 " |
| Oil of Cinnamon | 25 " |
| Glycerin | a sufficiency. |

Dissolve the carmine in a little solution of ammonia, and mix it well with the chalk and orris root; then add the soap and the essential oils, mixing the whole thoroughly in a mortar, and sifting to insure thorough division of the oils and the coloring matter. When this is done return the powder to the mortar, and make into a hardish mass with glycerin. The mass is now to be formed into cakes, and may be put up in tiny porcelain jars.

An alternative flavoring compound is composed of oil of peppermint, 10 parts; oil of lemon, 10 parts; and oil of cinnamon, 5 parts. The "Pâte" may be rendered "antiseptic" by the addition of 1 per cent of oil of thyme dissolved in a sufficiency of rectified spirit. Salicylic acid should not be used, as it combines with the chalk and so loses much of its value. After the cakes have been moulded they may be hardened by exposing to gentle warmth, and a polish given to the surface by light rubbing with a soft cotton cloth.—*Chem. and Drugg.*

**Oil of Birch and Oil of Wintergreen** were reported in August last by Messrs. Trimble and Schroeter to be physically and chemically identical, both consisting mainly of methyl salicylate with the addition of a hydrocarbon having a formula of $C_{15}H_{24}$, together with small quantities of benzoic acid and ethyl alcohol. They also stated that a sample of artificial wintergreen oil examined by them contained the properties neither of the natural oil nor of methyl salicylate. In reply to this, Dr. Power reports the examination of a number of samples, showing that natural wintergreen oil consists of methyl salicylate and 0.3 per cent or less of lævogyrate terpene; that oil of birch, when pure, consists simply of methyl salicylate, and is inactive towards polarized light; and that neither contains benzoic acid nor, so far as he has been able to satisfy himself, any ethylic alcohol. [In the January number of the *Am. Jour. of Pharm.*, Messrs. Trimble and Schroeter defend their position and combat some of these statements. —ED. AM. DRUGG.]—*Pharm. Journ.*

**Anhydrous Sulphite of Potassium.**—The crystalline sulphite of potassium ($K_2SO_3.7H_2O$) contains 7 molecules of water, and is rapidly altered on exposure to air, losing water and becoming gradually oxidized to sulphate of potassium. The well-known firm of Kahlbaum (Berlin) now puts the salt on the market in an anhydrous condition. In this form it is perfectly stable.

It would be of advantage to have sulphite of sodium in the same anhydrous form.

**Credit to the Druggist.**—Dr. G. H. Peirce, of Danbury, Conn., writing to the *New England Medical Monthly*, says: When a druggist can wrestle with prescriptions like the following, and neither himself nor the patient get downed, we think he deserves a credit mark. The following prescription was handed me the other day by one of our drug clerks, who had kept it, not on "file," but for curiosity's sake:

DANBURY, CONN.

MR. R. Please send me 15c. of grose of sulperment and 10c. purselen pouder and please make the mint as strong as you can as I want to put it on the walls. MRS. M.

Now this, in correct vernacular, should read: fifteen cents' worth of corrosive sublimate and ten cents' worth of Persian insect powder, etc.

**Vaseline Ointments** may be emulsified quickly by adding water and eight drops of castor oil to each drachm of the ointment, and triturating. This is said to be especially serviceable in the case of ointments, with a petrolate basis, which contain iodine or iodide of potassium, etc., as it prevents their decomposition.—*Drugg. Bull.*

**Benzoate of Mercury** is prepared by Mr. Bourquelot as follows: Dissolve 125 parts of oxide of mercury in 250 parts of nitric acid of 1,020° with the aid of gentle heat; add 4,000 parts of water, and filter. Also dissolve 188 parts of benzoate of sodium in 4,000 parts of water, and filter. Mix the two solutions slowly while stirring. This gives a bulky precipitate, which should be collected on a cloth and carefully washed with cold distilled water. The preparation is then pressed and dried with gentle heat, and yields a white powder, sparingly soluble in ether, alcohol, chloroform, or water, but easily soluble in a watery solution of common salt. It does not precipitate albumen, and may, consequently, be employed hypodermatically. With alcohol or ether the benzoate turns yellow, being transformed into the basic salt.—*Drugg. Bull.*

**Creosote and Iodoform.**—Barthélemy's formula, for use in cases of consumption, is:

| | |
|---|---|
| Iodoform (powdered) | 2 Gm. |
| Creosote | 3 " |
| Balsam of Tolu | 5 " |
| Benzoin (powdered) | 5 " |
| Glycerin | 3 " |

The creosote and iodoform are first mixed, the glycerin added, and the whole is then to be triturated for two minutes, after which the balsam and benzoin are added.—*Drugg. Bull.*

**Gelatinous Bottle Wax for Covering Corks.**—In storing volatile liquids which are solvent of resinous material, the ordinary bottle wax in which bottle necks are commonly dipped is generally inadmissible by reason of this solvent action of the liquid upon it. In such cases the following answers admirably, giving a perfect closing; and, moreover, the top is easily pared off with a knife when the bottle is to be opened:

| | |
|---|---|
| Soft Gelatin or good Glue | 3 parts. |
| Water | 9 " |
| Glycerin | 2 " |

Melt the gelatin in the water and then stir in the glycerin. Any coloring matter can be added, and the bottle necks should be quite free from grease. A second dip can be given if requisite, and the top can be stamped while soft with a slightly greased metal seal, or warm stereotype (slightly oiled), or an india-rubber stamp.—*Photo-Review.*

**Anti-Catarrhal (or Cold) Pills.**—Dr. S. S. Cohen, of Philadelphia, recommends as a remedy for ordinary catarrhal colds a compressed tablet containing three grains each of salol and terpine hydrate—one or two to be taken every second, third, or fourth hour, according to indications.

**Chocolate Syrup for Soda Fountains.**—The following is said by L. G. Heinritz to be superior in strength and flavor to those made with the prepared chocolate or extracts now in the market:

| | |
|---|---|
| Confectioner's Chocolate | ½ pound. |
| Hot Water | 2 quarts. |
| Condensed Milk | 1 can. |
| Granulated Sugar | 5 pounds. |
| Whites of two Eggs, | |
| Extract of Vanilla | 1 ounce. |
| Gum Foam | 1 ounce. |

Cut the chocolate finely into a porcelain-lined evaporating dish, and with the aid of heat and a pestle reduce the chocolate to a smooth paste. Add the water (boiling hot) gradually, stirring constantly; then stir in the condensed milk and sugar until both are dissolved. When cold, skim off the cocoa butter, particles of chocolate, etc., add the beaten white of eggs, vanilla, and gum foam, and strain through muslin. Confectioner's chocolate costs from twenty-eight to thirty-five cents per pound, and the cost of the entire materials is about ninety-five cents per gallon.—*N. E. Druggist.*

**Creosote Pills.**—A correspondent of *L'Union Pharmaceutique* has tried the various propositions for making creosote pills, and regards that made by Mr. Martindale, of London, the best:

| | |
|---|---|
| Creosote, | |
| Neutral [Castile] Soap, powd | ãã equal parts. |

Introduce them into a wide-mouthed flask, cork, and agitate well. Digest on a water-bath until the mass is melted, then allow to cool. It contains, of course, one-half its weight of creosote.

This mass mixes easily with any other substance and without decomposition. The soap must be neutral and dry. If not available in a dry and powdered condition, Castile soap may be melted in a solution of salt, separated by cooling, then rasped, dried by heat, and powdered.

**Lanolin as an Ointment Base.**—H. Helbing, in view of the viscidity of lanolin, suggests the following compound as better suited as an ointment base than lanolin by itself:

| | |
|---|---|
| Anhydrous Lanolin | 65 parts. |
| Liquid Paraffin | 30 " |
| Ceresin | 5 " |

Melt together and incorporate 30 parts of water by beating.—*Pharm. Jour.*

**Bordet's Hair Tonic** consists of the following:

Carbolic acid, tincture of cantharides, each 30 minims; tincture of nux vomica, f. ʒ ij.; compound tincture of cinchona, f. ʒ i.; cologne water, f. ʒ i.; cocoanut oil, enough to make f. ʒ iv.

This is to be applied to the scalp twice daily with a small sponge.

**Transparent and Permanent Collodion.**—A correspondent of the *Druggists' Bulletin* says that a transparent collodion is in use in Paris which is not only perfectly clear, but remains limpid for an indefinite time. It is prepared by shaking an officinal collodion with quartz sand which has previously been washed and carefully calcined. The action is purely mechanical, the suspended particles adhering to the grains of sand and settling to the bottom of the container in a gelatinous mass.

**Testing Chemical Reagents.**—The methods given by Krauch ("Die Prüfung der chemischen Reagentien auf Reinheit"; see this journal, 1889, page 92) for testing the purity of copper oxide are insufficient, as commercial copper oxide frequently contains lime, an impurity which would give rise to considerable errors in analyses. A sample of the granulated substance was found to contain 0.39 per cent and a sample of the powder 1.02 per cent of calcium oxide. Lead chromate contains lead oxide; in one sample examined 13.27 per cent of lead oxide was found. —M. v. NENCKI in *Monatschefte*, 10, 233, and *J. Chem. Soc.*

**Foreau's Syrup.**—The physician of Napoleon the First is said to have prescribed the following for the sudden attacks of hoarseness with which the emperor was often affected:

| | |
|---|---|
| Liq. Ammonii fortioris | ♏x. |
| Syr. Erysimi | ʒ iss. |
| Infus. Tiliæ Flor | ʒ iiss. |

M. To be taken as one dose.

*Erysimum officinale* (*Sysimbrium offic.*), or hedge mustard, is a small annual growing almost everywhere in the United States and Canada. The infusion of linden (tilia) is used simply as an agreeable vehicle, and may be replaced by any other pleasant vehicle.—*St. Louis Med. and Surg. Jour.*

**Absorbent Cotton.**—A French mode of preparing absorbent cotton is said to yield a better product than is commonly found here. Carded cotton is first immersed in boiling water rendered alkaline with soda or potash. It is then pressed and placed in a five-per-cent solution of chloride of lime, after which it is washed with pure water and plunged into water slightly acidulated with hydrochloric acid. Finally it is washed with pure water and air-dried.—*Drugg. Bull.*

**Petroleum in India.**—The *Delhi Courant* states that search for petroleum along the banks of the Lepan River, in Langkat, has resulted in the discovery of large deposits of that oil. Raw petroleum oozes out of the ground at many places, where the natives have consequently dug pits. The output from most of the latter has never been considerable, and shows fluctuation. At Telaga Tunggal, where the boring reached a depth of about 350 feet, more important results have been arrived at. Appearances indicate that the main reservoir has been tapped there. The oil met with in the other pits and deposits proved to have found its way above ground from that storing place. The oil tested yields 35 per cent of lamp oil of good quality. It does not contain harmful ingredients, and offers advantages as a lubricator. The exact depth of the other deposits remains to be determined before an estimate of working expenses can be accurately made.

**Strychnine for Inebriety.**—The excellent results which several authors obtained with strychnine in the treatment of inebriety induced Dr. Taroshewsky to undertake a series of experiments with a view of studying the antagonism between strychnine and alcohol. The results of these experiments are published in the *D. Med. Ztg.*, and the author arrives at the following conclusions:

1. Strychnine undoubtedly neutralizes the toxic and narcotic effects of alcohol.
2. Prolonged administration of strychnine and great quantities of alcohol combined is not followed by the pathological changes in the tissues which invariably appear when alcohol alone has been given for any length of time.
3. There are, of course, some limits for this protecting action of strychnine, and the prolonged use of strychnine itself may do harm.
4. In all cases of alcoholism strychnine ought to form the essential element of medical treatment.
5. Strychnine may also be considered the most powerful prophylactic against alcoholism.—*Br. and Col. Druggist.*

THE

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CHARLES RICE, PH.D.....ASSOCIATE EDITOR

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## EDITORIAL.

THE question has repeatedly been put to us whether it is not possible to make a compromise between the advocates of the champions of the system of "parts by weight" and those who advocate the use of definite weights and measures, by giving, in the Pharmacopœia, with each working formula, the required quantities in both systems. One of our correspondents (see Query 2,416 in this number), who has put in a plea in favor of this method, points to the British Pharmacopœia, where —as he says—this very method has been introduced. That our correspondent has misunderstood the matter will appear further on.

We have given this question a good deal of attention, and may assist in clearing up some doubts regarding its solution. In the preparation of the "Report on the Revision of the U. S. Pharm., preliminary to the Convention of 1880;" etc. (8vo, New York, 1880), many of the working formulæ of the Pharmacopœia of 1870 are given, side by side, in the old weights and measures, translated into the exact equivalents in parts by weight, and these equivalents rounded off to convenient figures. On examining the whole series, it will be found that the proportions as established by the rounded-off figures, while in most cases not very materially deviating from the exact equivalents, yet are so far different that two products—one made after the first formula, by actual weight and measure, and the other, by the rounded-off proportions, in parts by weight—will not be identical. It is, of course, well understood that in the majority of cases—for instance, in tinctures, mixtures, syrups, etc.—this discrepancy would probably not be greater than that found in two products made by two different operators, by one and the same process, from materials which are unavoidably varying in their composition.

But can the Pharmacopœia sanction the use of two alternate formulæ for one and the same preparation when it is known beforehand that these formulæ cannot produce identical products? Manifestly not. We do not think that any arguments will or can be advanced in favor of introducing doubt or uncertainty into the Pharmacopœia designedly. The progress of science in all departments constantly reveals new facts, which render corrections necessary in pharmacopœial descriptions and directions, and it is our duty to *eliminate* all doubtful,

uncertain, and incorrect statements, but not to introduce any knowingly. Exact equivalents for parts by weight may, of course, be calculated in actual weights and measures, but the proportions would be so unwieldy or delving into fractions that they would become practically useless.

If our system of weights and measures were like the English, in which weights are commensurate with measures, the difficulty would be less. But even then it would be next to impossible to obtain simple proportions in converting parts by weight into actual weights and measures.

In the British Pharmacopœia, the term "fluid part" stands as a synonym for the measure or volume of a weight of water corresponding to the weight substituted in practice for "part" in any given formula. For instance, *Cataplasma Lini* is directed to be prepared by the following formula:

| | |
|---|---|
| Linseed Meal | 4 oz. or 2 parts. |
| Boiling Water | 10 fl. oz. or 5 fluid parts |

We can prepare this either by the definite weight-and-measure formula first given, viz., by mixing 4 av. oz. of linseed meal with 10 fl. oz. (Brit.) of boiling water; or, supposing we wish to make a larger quantity, we can substitute, for instance, the word "pound" for "part," when the formula becomes:

| | |
|---|---|
| Linseed Meal | 2 pounds av. |
| Boiling water | a volume equal to 5 pounds av. of water, |

but this volume is half an imperial gallon, or 4 pints of 20 fl. oz. each, each fluidounce corresponding to a weight of 437.5 grains of water. Since the imperial ounce and pound, by measure and by weight, are commensurate with each other, the English pharmaceutical profession has made but little complaint against the introduction of the "fluid parts," which have, without introducing discrepancies, been given as alternatives in many formulæ.

In our judgment, then, it is impracticable to introduce alternative formulæ into our Pharmacopœia except, in a few cases where chemicals are directed to be produced which are capable of being assayed. And we have no doubt that those who have given any serious thought to this subject will arrive at the same conclusion.

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THE preface to the second part of the "Digest of Criticisms on the U. S. Pharmacopœia, Sixth Decennial Revision," contains two provisional lists—(1) of articles recommended to be dropped in the next revision, and (2) of articles recommended to be introduced. In some quarters these lists have been interpreted as being prepared and published as the deliberate and official selection of the present Committee of Revision. This is a mistake, as will be readily seen if the preface is carefully read. The two lists were made up by the chairman of the Committee from materials which had come into his hands, either in response to inquiries or unsolicited, and they do not pretend to do more than to form a rough basis for suggestions and criticisms. It was deemed advantageous to give an opportunity to produce testimony in favor or against the retention or acceptance of the several substances enumerated, at as early a time as possible, so that the next Committee of Revision may be able to start work on known data.

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IT was recently stated by a New York daily paper that a wholesale firm in this country, failing to import sophisticated opium owing to the standard of morphine strength enforced by the customs officers, have brought over a Turkish expert, and are engaged in adulterating opium that has passed the customs inspection.

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**E. Schering,** the well-known founder of the chemical works formerly bearing his name, and subsequently enlarged to a stock company under the firm name "Chemische Fabrik auf Aktien (vormals E. Schering)," died at Berlin on December 27th, 1889, at the age of sixty-six years. He was a man of remarkable resources, enterprise, and ability, and his loss will be long felt by those who were associated with him in business.

**Dr. G. Kerner,** for many years the manager and latterly a director of Zimmer's Quinine Works, at Frankfort-on-the-Main, Germany, died suddenly on the 9th of February. As the originator of "Kerner's test" for cinchona alkaloids, and as a manufacturer of cinchona products, his reputation is world-wide.

**Supplement to the British Pharmacopœia.**—In accordance with an invitation from the Pharmacopœia Committee of the British Medical Council, the Pharmaceutical Society at a recent council meeting appointed, as a committee to assist in the preparation of the proposed Addendum to the British Pharmacopœia, the following gentlemen, viz.: The President, Mr. C. Umney; vice-president, Mr. Alexander Bottle; Dr. Inglis Clark, Mr. Charles Ekin, Mr. Samuel Gale, Mr. H. G. Greenish, Mr. N. H. Martin, and Mr. W. Martindale.

**Pharmacopœial Supplement.**—The German Apothecaries' Association proposes to publish a supplement to the forthcoming German Pharmacopœia which is to embrace all that is known of value regarding recently announced chemicals and vegetable preparations. The *Druggists' Bulletin* of Detroit suggests that our next revision committee should provide something of corresponding character.

**Austriacum,** the new element which Dr. Brauner discovered last year in association with tellurium, has also been found by Dr. Anton Grünwald. At least Dr. Grünwald has found in tellurium, antimony, and copper a hitherto unknown element, X of Mendelejef's eleventh series. It is related to tellurium and to bismuth, and in his communication to the Imperial Academy of Sciences the author says it is probably identical with "austriacum."—*Chem. and Drugg.*

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## QUERIES & ANSWERS.

*Queries for which answers are desired, must be received by the 5th of the month, and must in every case be accompanied by the name and address of the writer, for the information of the editor, but not for publication.*

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No. 2,413.—**Granular Effervescent Salts** (A. B.).

We are not aware of the existence of any work, large or small, which treats of the preparation of granular effervescent salts in a detailed manner. Most writers who have treated this subject give only general directions, based upon limited experience. Those who have made a specialty of the subject, and who have, no doubt, discovered many important improvements in practical manipulation, have preferred to keep these details to themselves.

No. 2,414.—**Literature on Perfumery** (E. N. L.).

The work which you inquire about is probably the following, though this appeared, not in 1889, but in 1888: "Die Riechstoffe, und ihre Verwendung zur Herstellung von Duftessenzen, Haarölen, Pomaden, Riechkissen," etc. [6th ed.], von Dr. St. Mierzinski. [70 illust.] 8vo, Weimar, 1888. The translation of the above title is "Odorous Substances, and their Use in the Preparation of Aromatic Essences, Hair-oils, Pomades, Sachets," etc. We have given several extracts from this work in our volume for 1888.

No. 2,415.—**Luminous Paint** (H.).

Your letter was, for some unknown reason, delayed.

What is understood under "luminous paint" are certain metallic compounds which have the property of being more or less luminous and "phosphorescent" in the dark, after having been for some time exposed to the light. There are many compounds occurring in nature which possess this property, among them a whole series of native minerals, and even, though in a minor degree, such substances as tartaric acid, gum arabic, nitrate of potassium, borax, etc.

But for technical purposes the sulphides of certain metals have been found more suitable than anything else. To a large extent, the commercial luminous paint consists of sulphide of calcium, prepared by heating burnt oyster shells with sulphur in a covered crucible.

We refer you, for detailed information regarding this subject, to Karmarsch und Heeren, "Technisches Wörterbuch" (by Kick and Gintl), vol. v., page 384 ("Leuchtsteine").

No. 2,416.—**Alternative Formulæ in the U. S. Pharm.** (O. G. W.).

This correspondent recommends to construct the working formulæ of the U. S. Pharm. on the plan of the scheme shown below, in which both parts by weight and actual measures and weights are given. The scheme is as follows:

*Tinctura Rhei Aromatica.*

| | | | |
|---|---|---|---|
| 20 parts | Rhubarb | 6½ oz. av. | |
| 4 " | Cinnamon | 1¼ oz. " | |
| 4 " | Cloves | 1¼ oz. " | |
| 2 " | Nutmeg | 273 grains | |
| to make 100 " | Diluted Alcohol | to make 32 fl. oz. | |

Mix the rhubarb, cinnamon, and nutmeg, and reduce the mixture to a moderately coarse (No. 40) powder; moisten the powder with *fifteen parts* [4 fl. oz.] of diluted alcohol, and macerate for twenty-four hours; then pack it firmly in a cylindrical percolator, and gradually pour diluted alcohol upon it until *one hundred parts* [32 fl. oz.] of tincture are obtained.

Such an arrangement would be very convenient, if it were possible to give exact equivalents of both systems. In a number of cases this may be done, but in many others it is impossible to do so in simple proportions. We refer our correspondent to an editorial in this number.

No. 2,417.—**Chewing Gum** (A. Sch.).

We have an inquiry from a European correspondent which shows that the fame of tutti-frutti and of other admired brands of chewing gum has not yet penetrated into the innermost recesses of the Continent of Europe, whence it may be inferred that there is still a large territory for the "put-a-nickel-in-the-slot machine" to conquer. For the information of our unsophisticated European friend we will state that "chewing gum" originally was simply any native balsamic exudation derived from various American trees (usually the spruce), often collected by the "chewers" themselves, but also collected for sale. The habit of chewing gum, originally confined to backwoodsmen, gradually spread, and was distinctly fostered by the enterprise of dealers and manufacturers, who hit upon the idea to make certain artificial mixtures, suitably flavored (with sassafras, wintergreen, lemon, etc.), which would take the place of the rather "wild"-tasting native gums, or rather gum resins. The main object of "gum chewing" is, no doubt, the consolation (?!) derived by the chewer from being able to accompany his, or generally her, thought—if there be any—by some exercise or motion.

The composition of modern chewing gum is usually paraffin, with some balata (gum chicle), exhausted balsam of tolu, and similar ingredients. When such a gum lozenge is chewed, it becomes soft, pliable, plastic, may be rolled and squeezed about by the tongue, and appears to afford to the chewer—to judge from his appearance—the most lively satisfaction.

Our friend should, however, understand that the habit of chewing gum is not considered a sign of good breeding, but is mostly confined to the less refined portion of the community.

No. 2,418.—**Cologne** ("Photo").

In the formula given in our reply to query 2,191 (in our July number for 1889), the quantity of deodorized alcohol to be used is given as "000", which should be 3,000, the "3" having evidently broken off. We will repeat the formula here in full:

| | |
|---|---|
| Oil of Bergamot | 80 Gm. |
| " " Lemon | 30 " |
| " " Ylang | 30 " |
| " " Neroli, bigar | 20 " |
| " " Rose Geranium | 3 " |
| " " Rose | 4 drops |
| Tinct. of Musk | 50 Gm. |
| " " Tolu | 12 " |
| Acetic Ether | 15 " |
| Orris Root | 120 " |
| Deodorized Alcohol | 3,000 " |

Macerate for at least forty-eight hours in a warm room, the bottle being secured against loss by evaporation. Then add:

| | |
|---|---|
| Fresh Cow's Milk | 300 Gm. |
| Deodorized Alcohol | 500 " |
| Tinct. of Benzoin | 50 " |
| Tinct. of Musk | 20 " |

Mix thoroughly by agitation, and set the mixture aside, well corked, in a cool place for a few days. (It is preferable to set it aside for some weeks, if time can be spared, since the alcohol gradually causes a deposition of crystals of sugar of milk on the sides of the container if the liquid is filtered too soon.) Finally filter, and to the filtrate add:

| | |
|---|---|
| Oil of Patchouli | 0.5 to 1 Gm. |
| Deodorized Alcohol | 20 Gm. |

The patchouli must be regulated according to individual liking.

Particular care should be taken that only the very best oil of rose geranium, free from any terebinthinate or other foreign flavor, be used, as otherwise it would certainly spoil the product. If it cannot be had of good quality, it had better be left out.

We are personally acquainted with the product, and deem it very fine. It may be varied by slight changes in the quantities of the ingredients.

No. 2,419.—**Fluid Extract of Roasted Coffee** (Harrisburg).

You will find a formula for this preparation in the National Formulary under No. 141. At the meeting of the Missouri Pharm. Assoc. of last year, Mr. G. H. Chas. Klie proposed another process without using alcohol, which he described in the following words:

I decided to prepare a fluid extract without alcohol. I proceeded as follows: I took 2 pounds avoirdupois of roasted coffee—about No. 30 powder—and moistened it thoroughly with 14 fluidounces of boiling water containing 25 per cent of glycerin. The moistened powder was packed moderately tight into a percolator—glass or earthenware percolators are best—and the same menstruum, boiling water containing 25 per cent of glycerin, was used for exhaustion. Look out for your glass percolator when you use this menstruum. However, if the glass is of good quality and has become evenly warm from contact with the hot moistened powder, no break need occur. With a metal percolator no extra care is necessary. The very best percolator for this process is one with a jacket, in which the menstruum can be kept hot during the whole operation. But this is not indispensable. The first 28 volume ounces [meaning a volume equal to 28 avoirdupois ounces of water] of percolate are placed aside as finished extract, and percolation is continued until three percolates, each 2 volume pounds [a volume equal to 2 pounds avoirdupois of water], numbered respectively 1, 2, and 3, are obtained, when the coffee should be practically exhausted. These three percolates are used successively for the next two pounds of coffee, and so on indefinitely or until you stop making the fluid extract. To prevent the reserve percolates 1, 2, and 3 from spoiling, I evaporate until only the glycerin containing the extractive matter is left. This is used in the next process in the same proportion as when pure glycerin is used.

Wishing to ascertain whether the ground coffee left in the percolator was really exhausted by the treatment as described, percolation was carried on after Nos. 1, 2, and 3 had been obtained, until one-half gallon more of percolate had been secured. This was concentrated, precipitated with subacetate of lead, the lead precipitated by sulphuretted hydrogen, filtered, the filtrate rendered slightly acid and shaken with chloroform. The chloroform solution, upon evaporation, left a residue weighing one-half grain, showing that exhaustion was almost perfect.

At the close of his paper the author says:

I have used fluid extract of coffee at the table for quite a time, and must say I am much pleased with it. I am never annoyed by coffee grounds, nor does it ever exhibit the bluish-gray color characteristic of coffee which has been in contact with metal a certain time, and to which milk is then added.

No. 2,420.—**Keratinizing Pills** (F. T. D.).

This correspondent says that he has had occasion to coat some naphthalin pills with keratin, but has been unable to find a method for doing so.

We are not quite sure whether Mr. D. means to say that he has met with some peculiar difficulty in applying the keratin coat to naphthalin pills, or whether the keratin itself and the general method of coating pills with it are unknown to him.

As we are inclined to infer the latter, and as there is not likely to be any special wrinkle to be observed in the case of naphthalin pills, we will first refer him to articles on keratinizing pills which have appeared in this journal: viz. particularly our volume for 1888, page 149; 1889, 154, and next give an abstract on the subject from Merck's *Bulletin* (January, 1890) and from Fischer's "Neuere Arzneimittel."

Keratin is the natural horny substance of the epidermis, nails, claws, hoofs, hair, feathers, horns, quills, etc. For pharmaceutical purposes, keratin is usually obtained from the quills of geese or other domestic fowl, as it is obtained from this source in a much purer condition. Purified keratin is soluble in acetic acid, in water of ammonia, and in alkaline liquids generally. It is insoluble in hydrochloric acid, and not affected by pepsin. Some price lists quote "pepsinized keratin." This is intended to mean keratin from which any matter digestible by pepsin has been extracted.

Pure keratin, therefore, is entirely insoluble in the gastric fluid, and, therefore, any pill, bolus, etc., coated with it will remain undissolved in the stomach and be carried whole into the intestine. The intestinal fluids, however, are alkaline, and it is here that the coating of the pill, bolus, etc., is dissolved, exposing the medicament and allowing it to exert its proper action.

It matters not what medicaments are used in the pills, provided they be worked up and maintained *sufficiently dry* to keep their contents from mingling with or injuring the keratin coating.

The pills, therefore, must not only *not* contain *any appreciable moisture*, but also no hygroscopic substances, such as most vegetable excipients; for evaporation in the former case might cause the pills to shrink, and absorption of moisture in the latter might make them swell, thus

in either case destroying the continuity of the keratin coating.

The body of the pill mass may consist of a mixture of

Yellow Wax ..... 1 part,
Talcum, or
Butter of Cacao .....10 parts,

melted together.

If dry diluents are wanted, kaolin, bole, or powdered charcoal may be used.

The pills, when made from a mass prepared on the above principle and properly medicated, are best immersed (according to Dr. B. Fischer) in melted butter of cacao for a moment and then rolled in powdered graphite to smooth them. Next they are coated with keratin by rolling them in a solution of it until the solution is evaporated, repeating the process (perhaps as many as ten to twelve times) until the coating is thick enough.

The sufficiency of the coating may be determined by making at the same time a few trial pills of calcium sulphide, a little larger than the rest so as to be able to recognize them. When it is assumed that all the pills are sufficiently coated, one of these sulphide-of-calcium pills is taken. If no eructation of hydrosulphuric acid gas is experienced within a few hours thereafter, it may be safely assumed that the coating is sufficient.

In preparing the pill mass, fatty medicaments may be combined with wax or with a cerate. Aqueous extracts may be thickened with powdered acacia or tragacanth, and further with a non-hygroscopic vegetable or mineral powder. A cerate may then still be added, unless incompatible.

There are two kinds of solutions of keratin used :

1. *Ammoniacal Solution.*

Keratin ..... 7 parts.
Water of Ammonia ..... ..50 "
Alcohol (60 per cent) ..... ....50 "

Dissolve by gently heating.

2. *Acetated Solution.*

Keratin..... 7 parts.
Glacial Acetic Acid ..... .....100 "

Dissolve by gently heating.

The ammoniacal solution is preferable for pills containing pancreatin, trypsin, bile, sulphide of iron, etc., that is, for any substance which would be liable to be injured or decomposed by acids.

The acetated solution, on the other hand, is preferable for such substances as are incompatible with an alkali, such as salts of silver, gold, and mercury, chloride of iron, creosote, salicylic acid, etc.

In the case of chemically neutral substances—such, for instance, as naphthalin—either solution may be used.

The *keratinized pill* (or "*Ileac Pill*") is regarded by Dr. Unna an eligible vehicle for the administration of medicines which (1) are apt to irritate the mucous membrane of the stomach when administered for a long time; (2) impair the digestive process (f. i., lead acetate, corrosive sublimate, etc.); (3) are rendered inert or are decomposed by the gastric juice; (4) are specially intended to reach the intestine without change; and (5) are intended to exercise an indirect effect—not local—on gastric complaints (for instance, arsenic in dyspeptic anemia, cardialgia).

No. 2,421.—**Percentage Solutions** ("Young Drug Clerk").

This correspondent says: "Please inform me what proportion of a drug is to be used, as a rule, when it is ordered in solution by percentage; for instance, solution of cocaine, 10%, 15%, 20%, etc., such as is often prescribed by physicians. The U. S. P. and the Dispensatory give no light on this subject."

We would say, first, that the Pharmacopœia is not the place where information regarding this matter can be expected. This is a simple affair of arithmetic. When we speak of a 10-per-cent solution, for instance, it is understood that we mean one containing, *by weight*, 10 parts of a certain substance in 100 parts of the finished solution. For instance, on dissolving 10 grains of hydrochlorate of cocaine in 90 grains of water, we obtain 100 grains of a solution which, of course, contains 10 per cent of the salt. Our experience has shown us that, though this is so simple and plain, yet beginners are often puzzled when they receive an order to make, for instance, 2 fluidounces or any other definite volume of a solution of a fixed percentage. For instance:

℞ Sol. Cocainæ Hydrochlor. (4 per cent)... ....fl. oz. 4.

If it were required to prepare in *one* operation an *absolutely exact measure* (as determined, for instance, at 60° F.) of 4 fluidounces of the solution containing 4 per cent of hydrochlorate of cocaine, we acknowledge that the calculation would become somewhat difficult, as it would involve a previous knowledge of the specific gravity of a solution of the required percentage. But this is not the problem in practice. The real task is to prepare a *convenient quantity* of a true 4-per-cent solution—if practicable, a little over 4 fluidounces by measure—and then to dispense from this the quantity prescribed.

We would proceed as follows: A fluidounce of water at the ordinary temperature weighs, practically, 456 grains. Four fluidounces, therefore, weigh 1,824 grains. Assuming this to be, not plain water, but a 4-per-cent solution of the cocaine salt, it would contain 72.9, or practically 73 grains of it. Hence, to make 1,824 grains of the solution of cocaine (assuming, for the moment, that this would have the same specific gravity as water), we would have to take:

Cocaine Hydrochlorate..... 73 grains.
Water ..... .....1,751 "

Total.....1,824 "

In reality, this amount of the solution will not measure quite 4 fluidounces, but will be so near it that it is practically equal to that volume.

If there is a necessity to dispense not less than 4 fluidounces, the above given quantities need only be relatively increased, for instance to:

Cocaine Hydrochlorate..... ..... ..... 80 grains.
Water..... .....1,920 "

2,000 "

and of this solution, which measures over 4 fluidounces, the required volume dispensed. A method for obtaining the exact volume required will be given presently.

The more concentrated a solution is, and the heavier the solid dissolved therein is, the greater will be the weight of equal volumes of such solutions. If all solutions of equal percentage of dissolved substance occupied the same volume, it would be an easy matter to determine, once for all, the exact quantity of substance to be weighed out for preparing a solution of any desired volume. But this is not the case. With some substances a 20-per-cent solution, for instance, will occupy but little more bulk than the volume of the pure solvent itself; with other substances, however, the solution may occupy nearly twice the volume. This being well known, experienced dispensers, who often have certain percentage solutions to dispense, prepare for their use a table of proportions of substance and solvent required to obtain a definite amount of solution.

The calculation of these proportions is a comparatively simple matter. The best practical method is the following, in which it is supposed that it is required to find out the quantities, by weight, necessary to prepare *one pint* of a 50-per-cent solution of iodide of potassium, without consuming more iodide than is absolutely necessary—that is, without having any of the solution left over. This may be done in two steps:

1. First prepare such an amount of a 50-per-cent solution as will surely be less than the full volume (1 pint) required.

2. Having measured this exactly, calculate how much of the salt will be wanted for the remainder of the volume.

Supposing the operator first dissolves 4 troy ounces of iodide of potassium in enough water to make 8 troy ounces—which will, of course, produce a 50-per-cent solution. He will then measure the latter carefully, as near to 60° F. as possible, and he will find that it measures, practically, 5 fluidounces and 270 minims (or 2,670 minims). A pint, however, has 7,680 minims. He has, therefore, still to prepare 5,010 minims of the same kind (viz., 50 per cent) solution as had already been prepared. The amount of iodide of potassium required for this is found by a simple equation:

As 2,670 minims of a 50-per-cent solution is to 4 troy ounces, or 1,920 grains of iodide of potassium contained therein, so is 5,010 minims of a like solution to the amount of iodide required for this:

$$2{,}670 : 1{,}920 = 5{,}010 : x$$
$$x = 3{,}603$$

or, practically, 3,600 grains.

The operator will therefore add to the solution already prepared 3,600 grains of iodide of potassium, and gradually enough water to make the finished solution, measured at or near 60° F., amount to *one pint*.

He will then make a note that to make a pint of a 50-per-cent solution of iodide of potassium there are required (1,920 + 3,600 =) 5,520 grains of the salt.

### Information Wanted.

1. A. E. P. & Co. want to know what "Household Ammonia" is, or what might be dispensed when this is called for.

2. J. B. wants to know whether there is any one in this country who makes reliable thermostats constructed to maintain fixed temperatures between 200° and 225° F.

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**Purgative Chocolate.**—M. Giraud proposes a preparation made as follows:

Cacao (powdered and freed from oil)... ..... 50 Gm.
Sugar (powdered)..... .....100 "
Castor Oil ..... ..... 50 "
Vanilla (powdered)..... .....q. s.

Make into tablets.

The oil should be incorporated with the cacao, and the sugar and vanilla added. The ingredients must be well worked up on a heated slab, and allowed to cool in moulds.—*Chem. and Drugg.*